SUMMARY OF PRE-1975 ACS CUSTOMERS 1/5/87 E.2

AMERICAN CHEMICAL SERVICES
GENERATION OF THE DATA BASE

Two basic documents were used in generation of the "AMCHEM DATA BASE":

I. The Transaction Log covering the period from 9/15/55 through 10/31/72.
This document listed items charged to the customer by product name or service - such as Reclaim Solvent, Drumming Charge, Disposal Charge, Thinner, Alcohol, etc.

Significant column headings were "pounds/price" "gallons/price", "merchandise sales", "industrial service" and "industrial processing"

Both "industrial service" and "industrial processing" were used in the database. (Separation of the two items was of significance to ACS for sales tax purposes.)

II. The "Accounts Receivable Trial Balance Ledger" covering the period from 12/31/72 through 12/31/75.
This document listed "Company Name", "Customer Number", "Balance Outstanding" and "Current Month Transactions".

As discussed in more detail below, utilization of these records involved interpretation of each entry: whether it represented a sale, a recovery, a manufacture or a disposal. In addition, the disposition of the material by landfill or incineration had to be determined. Finally, various percentages had to be determined: directly landfilled, residue from solvent recovery, directly incinerated, and solvent recovery residue incinerated.

These determinations were made following conferences with past and present management of American Chemical Services, including George Murphy, the retired past president, Jim Tarpo, the present president and John Murphy, a member in the firm with knowledge of past manufacturing practices and customers. USEPA and one of their contractors, Roy F. Weston, were represented at the initial two day conference at Griffith Indiana when the "Transaction Log" was first explained.

As the work progressed, H. Hofmaier reviewed the work product with J. Tarpo and J. Murphy to insure that all interpretations of data were in keeping with the best recollections of events as they happened historically.

DATA NOT INCLUDED (NON-WASTE GENERATING)

At the initial conference in Griffith, George Murphy outlined a number of products and companies, each of which represented only manufacturing businesses which generated no landfilled waste. This was subsequently confirmed in a letter which was transmitted by Louis Rundio on July 9, 1986. A copy is attached. In addition, in the course of the several data review sessions, additional non-waste generating items surfaced - such as "drumming charges", "unloading charges", "equipment rental" and "handling charges". These were closely associated with manufacturing operations in the billing process, and generated no landfilled waste. All of these items were treated as "exceptions" and not included in the database.

DATA INCLUDED AS BEING WASTE GENERATING

All volumes and weights for items with charges in the "industrial processing" or "industrial services" categories were included unless George Murphy, Jim Tarpo, or John Murphy had specifically excluded them as non-waste generating, with plausible explanation. [For example, Tarpo and the Murphys knew that some products were manufactured only and generated no waste. Further, certain solvent recovery operations were solely removal of water from an organic (such as ethylene glycol) where the separated water was sewered, and the product cut was all returned to the customer.]

Where entries showed "disposal" rather than a product name, there frequently were no weights or volumes. A calculation was made to derive pounds from the dollar charge. A value of $.09/gallon was used as an average disposal charge; and 8 pounds/gallon was as the default density.

When working with data from the "Accounts Receivable Trial Balance Ledger", in which there were neither material descriptions nor values, it was necessary to work backwards: i.e., to utilize dollar amounts and to calculate volumes based on an average charge per gallon for the types of services that customers utilized. These services were categorized by J. Tarpo as "recovery", "disposal", or "disposal and recovery". Charges per gallon for each of these services were, respectively, $.10, $.20, and $.15. (Tarpo stated what the charges had been per gallon for "recovery" and "disposal". With respect to those customers for whom both recovery and disposal operations were conducted, and for whom there was no way to determine the actual split between the two, Hofmaier and Tarpo agreed that a reasonable approach was the somewhat arbitrary split of 50/50 and an average cost of $.15.)

ESTABLISHMENT OF PERCENTAGES FOR SOLVENT RECOVERY RESIDUES, AMOUNT LANDFILLED DIRECTLY, AND PERCENTAGE OF ASH ON INCINERATION

Following assembly of the data base and after reviewing to assure that all data included therein represented only that from waste generating operations, Jim Tarpo took a data printout and noted the following percentages based on his clear recollection of the individual customer's past business. He first estimated the amount of solid or unrecoverable material in each company's solvents received at ACS for recovery. In addition, he estimated the percentage of solvent residue remaining after completion of the distillation or other recovery process. Finally, he estimated the percentage of ash remaining after incineration. Since there were no dust collectors on these incinerators, ash collection was low, and ash came primarily from high solids content material.

INCINERATION HISTORY

The first incinerator was started in mid-1966. Its operation was initially inconsistent; on-stream time was low as experience was required to properly adjust viscosity and solids content of solvent recovery bottoms for good incinerator on-stream time.

A second incinerator was constructed, and the initial one was modified/rebuilt to provide greater reliability for incinerator operation.

Incinerator operation has been stated to be as follows:

6/1/66 through 12/31/67 - 50% of solvent recovery residue
1/1/68 through 12/31/68 - 65% of solvent recovery residue
1/1/69 through 12/31/69 - 75% of solvent recovery residue
1/1/70 through 12/31/70 - 90% of solvent recovery residue
1/1/71 through 12/31/71 - 95% of solvent recovery residue
1/1/72 through 12/31/75 - 100% of solvent recovery residue

Material accepted for disposal by incineration was always incinerated unless it had solidified or contained rubbish. In either of these cases, a percent "direct to landfill" was stated by Tarpo.

CALCULATION OF SOLIDS TO THE LANDFILL

Since the primary billing that appears in the transaction log refers to recovered solvent volume, it does not represent the actual volume received at ACS. To determine "gross pounds in", it was necessary to calculate back up to total pounds of contaminated or dirty solvent received for recovery. (This was based on Tarpo's estimate of the percent of residue after the recovery operation plus the recovered solvent, as shown in the

log.) Where there was also some portion of the shipment directly landfilled, that further gross-up was calculated from Tarpo's estimate of the percent of unrecoverable or solid material directly landfilled upon receipt.

From the gross material received, the percent landfilled directly, the percent residue after solvent recovery, the percent of solvent recovery residue incinerated (by year), and the percent ash remaining to be landfilled following incineration, the total amount landfilled for each company was calculated by category and in total.

AMERICAN CHEMICAL SERVICES
SUMMARY REPORT
TOTALS BY COMPANY
01/05/87

COMPANY NAME	(1) GROSS LBS IN	(2) DIRECT TO LF (IN LBS)	(3) % of TOTAL DIRECT TO LF	(4) RESTRUC TO LF (IN LBS)	(5) % of TOTAL RESTRUC TO LF	(6) SUBTOTAL (2) + (4)	(7) ADD TO LANDFILL (IN LBS)	(8) % of TOTAL ADD TO LF	(9) TOTAL LBS TO LF (6) + (7)	(10) % OF GRAND TOTAL
3 M COMPANY	717171	107573	2.20333	0	0.00000	107573	0	0.00000	107573	0.55139
A C ELECTRONICS	2200	0	0.00000	91	0.00063	91	0	0.00000	91	0.00047
A GOODMAN & CO	5906	389	0.01207	1063	0.00738	1452	0	0.00000	1452	0.00047
ABBOTT LABS	1562200	31237	0.63967	0	0.00000	31237	0	0.00000	31237	0.16017
ABRASIVE SYSTEMS COMPANY	10924	1057	0.02227	1964	0.01363	3051	0	0.00000	3051	0.01564
ACID PRODUCTS COMPANY	10473	1068	0.02188	1925	0.01336	2993	0	0.00000	2993	0.01535
ACME PRINTING INK	75382	7319	0.15402	10414	0.07228	17733	0	0.00000	17733	0.09093
ADCITE CHEMICALS INC	126840	0	0.00000	12684	0.00883	12684	0	0.00000	12684	0.06504
ADHERON	286397	28637	0.58641	165	0.00115	28802	510	0.24039	29312	0.15030
ADVERTISING METAL DISPLAY	3391	339	0.00694	610	0.00423	949	0	0.00000	949	0.00487
AEROSOL RESEARCH CO	119370	0	0.00000	3822	0.02697	3822	0	0.00000	3822	0.01959
AEROSOL TECHNOLOGIES INC	625006	89647	1.83635	0	0.00000	89647	0	0.00000	89647	0.45967
ALBERTO-CULVER CO	43840	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ALL STATES CONTAINER	325	32	0.00107	94	0.00063	146	0	0.00000	146	0.00075
ALLIED AUTOMATION	444	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ALLIED CHEMICAL	45333	4533	0.09286	0	0.00000	4533	0	0.00000	4533	0.02324
ANCO METAL PRODUCTS	23782	2378	0.04871	3210	0.02228	5588	0	0.00000	5588	0.02865
ANERICAN DECAL CO	232824	3288	0.06735	2935	0.02051	6238	0	0.00000	6238	0.03199
ANERICAN FINISHES	9190	919	0.01883	2481	0.01722	3400	0	0.00000	3400	0.01743
ANERICAN MARIETTA CO	3886172	0	0.00000	603049	4.19725	603049	0	0.00000	603049	3.10242
ANERICAN NAME PLATE	8604	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ANERICAN PAINT CO	50076	0	0.00000	10008	0.06946	10008	0	0.00000	10008	0.05132
ANERICAN ROLLER COMPANY	7907	0	0.00000	2372	0.01646	2372	0	0.00000	2372	0.01216

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AMERICAN WARMISH CO	14000	0	0.00000	2000	0.01943	2000	0	0.00000	2000	0.01436
AMERSHAM/SEARLE CORP	58264	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
AMES DISTRIBUTING CO	147693	0	0.00000	43743	0.30359	43743	0	0.00000	43743	0.22429
AMES METAL PRODUCTS	115598	0	0.00000	17516	0.12157	17516	0	0.00000	17516	0.08981
AMOCO CHEMICALS CORP	49200	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
AMOS MOLDED PRODUCTS	50854	10168	0.20020	7490	0.05198	17658	0	0.00000	17658	0.09054
AMTRON INC	11000	0	0.00000	148	0.00103	148	0	0.00000	148	0.00076
ANACONDA WIRE & CABLE	2361	0	0.00000	118	0.00082	118	0	0.00000	118	0.00061
ANDERSON COMPANY	530225	6968	0.14273	56021	0.38880	62989	0	0.00000	62989	0.32298
APEX METAL PRODUCTS CO	78172	0	0.00000	15248	0.10583	15248	0	0.00000	15248	0.07818
ARCHER DANIELS MIDLAND	13500	0	0.00000	1350	0.00937	1350	0	0.00000	1350	0.00692
ARCO PRODUCTS	5777	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ARMSTRONG CHEMICAL	350793	35735	0.73201	5934	0.04118	41669	0	0.00000	41669	0.21366
ASHLAND CHEMICAL CO	4487248	125705	2.57498	0	0.00000	125705	0	0.00000	125705	0.64456
ASHLAND OIL CO	41552	1092	0.02237	0	0.00000	1092	0	0.00000	1092	0.00560
ATI CONTINENTAL DIVISION	27377	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ATLANTIC RICHFIELD	16381	1037	0.02124	1421	0.00986	2458	0	0.00000	2458	0.01260
ATLAS ELECTRIC DEVICES	2100	210	0.00430	132	0.00092	342	0	0.00000	342	0.00175
AUBURN DIE CAST CORP	129176	6458	0.13229	0	0.00000	6458	0	0.00000	6458	0.03311
AUTOMATIC ELECTRIC CO	44001	4394	0.09001	7917	0.05495	12311	0	0.00000	12311	0.06313
AVONDALE COMPANY	48686	4866	0.09968	7980	0.05538	12846	0	0.00000	12846	0.06587
BAKCO INC	48904	4858	0.09951	8234	0.05715	13092	0	0.00000	13092	0.06713
BANCROFT CORP OF AMERICA	173645	17350	0.35557	7636	0.05300	24994	0	0.00000	24994	0.12816

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BARKER CHEMICAL CO	59971	3596	0.11463	10075	0.06992	13671	0	0.00000	13671	0.00835
BARON-BLAKESLEE INC	88186	8810	0.10947	0	0.00000	8810	0	0.00000	8810	0.04517
BEE CHEMICAL CO	919274	81934	1.67836	29970	0.20800	111904	1470	0.69288	113374	0.58133
BELDEN MFG CO	137283	0	0.00000	41179	0.28580	41179	0	0.00000	41179	0.21113
BELL CHEMICAL CO	94934	0	0.00000	4747	0.03295	4747	0	0.00000	4747	0.02434
BENNETT INDUSTRIES	120087	0	0.00000	5789	0.04018	5789	0	0.00000	5789	0.02968
BIG BEN (ASHLAND)	2699875	0	0.00000	199724	1.38615	199724	0	0.00000	199724	1.02410
BIRD BARRIER (SPRING PIV)	348177	0	0.00000	103934	0.72135	103934	0	0.00000	103934	0.53294
BIRD-BARRIER CORP	358726	32316	0.66467	0	0.00000	32316	0	0.00000	32316	0.16573
BREIER ELECTRIC MFG. CO.	1885	180	0.00369	325	0.00226	505	0	0.00000	505	0.00259
BRUMATICK	273432	0	0.00000	46766	0.32457	46766	0	0.00000	46766	0.23980
BURNDY PRODUCTS CO	8400	839	0.01719	1511	0.01049	2350	0	0.00000	2350	0.01205
C P HALL CO OF ILLINOIS	9827991	0	0.00000	70815	0.49148	70815	0	0.00000	70815	0.36311
CANFIELD LABORATORIES	312	31	0.00064	56	0.00039	87	0	0.00000	87	0.00045
CANFIELD SOUP CO	170473	0	0.00000	7190	0.04990	7190	0	0.00000	7190	0.03687
CAPITOL CHEMICAL CO	268300	0	0.00000	53656	0.37239	53656	0	0.00000	53656	0.27512
CAPITOL PAINT AND VARNISH	169234	0	0.00000	33846	0.23490	33846	0	0.00000	33846	0.17355
CARBOLINE PAT CO	51963	0	0.00000	10386	0.07208	10386	0	0.00000	10386	0.05325
CARGILL INC	45600	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CARL DORN COLOR CARD	489921	49869	1.00105	4449	0.04581	55469	0	0.00000	55469	0.28442
CASPER TIN PLATE	1572	0	0.00000	109	0.00076	109	0	0.00000	109	0.00056
CASTING ENGINEERS	12208	1220	0.02499	2197	0.01525	3417	0	0.00000	3417	0.01752
CATALIN CORP OF AMERICA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0.00000	[illegible]	[illegible]

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CECO CORPORATION	444883	37729	0.77275	220	0.00156	37949	0	0.00000	37949	0.19459
CECO STEEL PRODUCTS	20445	7044	0.05826	2996	0.01455	4940	0	0.00000	4940	0.02533
CENTRAL RESISTOR	27240	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CENTRAL WAX & PAPER	10613	1060	0.03010	1674	0.01162	2534	0	0.00000	3534	0.01812
CHARTH PAPER PRODUCTS	4000	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CHASE PRODUCTS	1004639	62612	1.28256	4308	0.02990	66920	0	0.00000	66920	0.34314
CHEMICAL COMMODITIES	533991	4144	0.08534	177962	1.23512	182128	0	0.00000	182128	0.93387
CHEMICAL MAILERS INC	14175	1416	0.02901	2550	0.01770	3966	0	0.00000	3966	0.02034
CHEMFLEX CO	2110401	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CHICAGO ADHESIVE PROD	31111	3111	0.06373	280	0.00194	3391	0	0.00000	3391	0.01739
CHICAGO ALLIED MFG CORP	28221	2821	0.05777	5080	0.03526	7901	0	0.00000	7901	0.04051
CHICAGO DISTRIBUTING WORK	2944	147	0.00301	0	0.00000	147	0	0.00000	147	0.00075
CHICAGO LOOP INC	250883	0	0.00000	49548	0.34388	49548	0	0.00000	49548	0.25406
CHICAGO MOLDED PRODUCTS	67425	0	0.00000	13348	0.09264	13348	0	0.00000	13348	0.06844
CHICAGO ROTOPRINT CO	76542	0	0.00000	15305	0.10622	15305	0	0.00000	15305	0.07848
CHICAGO THRIFT ETCHING CORP	239082	0	0.00000	47807	0.33180	47807	0	0.00000	47807	0.24513
CHROMATIC PAINT CO	372937	0	0.00000	74594	0.51764	74594	0	0.00000	74594	0.38243
CLINTON COMPANY	553538	0	0.00000	110693	0.76825	110693	0	0.00000	110693	0.56758
CO OPTICAL MFG CO	2100	210	0.00430	378	0.00262	588	0	0.00000	588	0.00302
COCA-COLA CORPORATION	26132	13065	0.26763	0	0.00000	13065	0	0.00000	13065	0.06699
COMMERCE INDUSTRIES	127374	0	0.00000	25474	0.17680	25474	0	0.00000	25474	0.13062
COMMERCIAL CHEMICAL CO	20899	2088	0.05916	5200	0.03609	8088	0	0.00000	8088	0.04147
COPPOS CORPORATION	1571	157	0.00324	285	0.00198	443	0	0.00000	443	0.00227

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01/05/97

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CONNELLY FIRE EQUIP. CO.	1694	169	0.00346	305	0.00212	474	0	0.00000	474	0.00243
CONOLITE INC	55000	3500	0.11264	9900	0.06871	15400	0	0.00000	15400	0.07896
CONSERVATION CHEMICALS	1104704	55222	1.13110	0	0.00000	55222	10294	1.00960	65426	0.33548
CONTAINER CORP	1120033	0	0.00000	9394	0.06520	9394	0	0.00000	9394	0.04817
CONTINENTAL CAN CO	1270662	0	0.00000	198444	1.37727	198444	0	0.00000	198444	1.01753
CONTINENTAL OIL CO.	24500	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CORRECT MAINTENANCE	62096	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CRANE PACKING CO	331851	33181	0.67967	0	0.00000	33181	0	0.00000	33181	0.17014
CRO RAVE INC	4888249	0	0.00000	677566	4.70254	677566	0	0.00000	677566	3.47426
CROWN CORK & SEAL CO	165740	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CRYOVAC DIVISION	563405	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
CTS MICROELECTRONICS	2726877	0	0.00000	5433	0.03771	5433	0	0.00000	5433	0.02786
CURRIER & O CURRIER CO	388232	0	0.00000	86383	0.35709	86383	0	0.00000	86383	0.41217
D C FRANCHE CO	992951	99291	2.03370	61970	0.43015	161259	0	0.00000	161259	0.82686
DALBERT CHEMICAL CO	13562	0	0.00000	975	0.00677	975	0	0.00000	975	0.00500
DALES LABORATORIES	598065	0	0.00000	92337	0.64085	92337	0	0.00000	92337	0.47346
DAYTON CHEMICAL PRODUCTS	449653	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
DE SOTO CHEMICALS INC	4483785	230090	4.71323	911157	6.32374	1141247	3960	1.06652	1145207	5.87211
DEARBORN LITHOGRAPH	2569	256	0.00524	115	0.00081	371	0	0.00000	371	0.00190
DELCO RADIO DIVISION	513	51	0.00104	92	0.00064	143	0	0.00000	143	0.00073
DEVERT & DOUGHERTY INC	3407200	0	0.00000	499849	3.46912	499849	3742	1.76377	503591	2.58219
DIVISION CHEMICAL	79750	15950	0.32677	616	0.00428	16566	9	0.00000	16566	0.08494
DIXIE SERVICE	[illegible]	3743	0.07667	2043	0.01418	[illegible]	0	0.00000	5786	0.02710

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BERLINE CABINET HARDWARE	62144	6206	0.12713	10228	0.07099	16434	0	0.00000	16434	0.00427
BOEHR & ASSOCIATES	34125	3410	0.06985	6140	0.04261	9550	0	0.00000	9550	0.00497
BOU CHEMICAL USA	107256	21451	0.43941	0	0.00000	21451	0	0.00000	21451	0.10999
BREEDLAN PAINT SUPPLY	25000	0	0.00000	0	0.00000	0	170	0.00390	170	0.00091
BRYDEN RUBBER CO	40610	4060	0.08313	7300	0.05072	11366	0	0.00000	11366	0.00828
BU-HEL DECORATIVE CO	93350	9332	0.19367	17196	0.11935	26748	0	0.00000	26748	0.13715
BUFFALO MFG CO	39188	3918	0.07821	0	0.00000	3918	0	0.00000	3918	0.01938
E I DU PONT DE NEMOURS	4374850	0	0.00000	425517	2.95323	425517	0	0.00000	425517	2.18186
EDWARD J. MYERS	32000	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
EXCO ALCOA CONTAINERS	1472947	0	0.00000	292051	2.02693	292051	0	0.00000	292051	1.49751
EXCO PRODUCTS INC	495391	21519	0.44688	0	0.00000	21519	0	0.00000	21519	0.11034
ELECTRO-MAC CORP	65746	0	0.00000	13143	0.09122	13143	0	0.00000	13143	0.06739
ELI LILLY & CO	53153874	00000	1.63874	0	0.00000	00000	125000	58.91808	205000	1.05115
ELI LILLY (ELANCO)	1134586	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ELSWORT PAINT MFG CO	130971	13095	0.26824	289	0.00145	13384	382	0.18005	13466	0.07918
ELLIOTT PAINT & VARNISH	262063	26203	0.53675	0	0.00000	26203	466	0.21965	26669	0.13675
EMCONITE DIV	733995	36665	0.75106	0	0.00000	36665	0	0.00000	36665	0.18800
EMCONITE DIV (STINSONITE)	181242	9046	0.18530	4017	0.02708	13063	0	0.00000	13063	0.06698
EMLIN INC.	5447	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ENGINEERING APPLIANCE	2766	276	0.00565	24	0.00017	300	0	0.00000	300	0.00154
ENTERPRISE PAINT CO	1794086	36560	0.74891	61524	0.42700	98084	7450	3.51152	105534	0.54113
EUGENE DIETZGEN	1458	145	0.00297	262	0.00182	407	0	0.00000	407	0.00209
EXACTO PRODUCTS	2[illegible]	0	0.00[illegible]	484	0.00336	484	0	0.00000	484	0.00248

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F D GARDNER	1464	145	0.00297	262	0.00182	407	0	0.00000	407	0.00209
FAIRBURY INDUSTRIES	1583	138	0.00324	285	0.00198	443	0	0.00000	443	0.00227
FEDERAL PAINT MFG CO	10535	1052	0.02155	1895	0.01315	2947	0	0.00000	2947	0.01511
FEDERAL PAPER BOARD	894885	80482	1.64862	574	0.00398	81056	0	0.00000	81056	0.41562
FELSENTHAL INSTRUMENTS	3440	0	0.00000	284	0.00197	284	0	0.00000	284	0.00146
FENCO LABORATORIES	1977730	0	0.00000	98703	0.68503	98703	0	0.00000	98703	0.50611
FIBERITE CORP	22674	0	0.00000	3387	0.02351	3387	0	0.00000	3387	0.01737
FILTECH	17833	1781	0.03648	309	0.00214	2090	0	0.00000	2090	0.01072
FINISHING INC.	29400	2940	0.06022	5292	0.03673	8232	0	0.00000	8232	0.04221
FISHER BODY DIVISION	22222	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
FLINT INK CO	134300	13434	0.27520	9804	0.06806	23238	0	0.00000	23238	0.11915
FLINTKOTE COMPANY	99390	9468	0.19395	93	0.00065	9561	0	0.00000	9561	0.04902
FORT DEARBORN LITHOGRAPH	46960	9388	0.19231	4911	0.03408	14299	0	0.00000	14299	0.07332
FRAJON, INC.	45871	0	0.00000	4587	0.03128	4587	0	0.00000	4587	0.02311
FRANK B. HOLDEN CO	6825	682	0.01397	1228	0.00852	1910	0	0.00000	1910	0.00979
FREDERICK POST CO	16055	1605	0.03290	2889	0.02005	4494	0	0.00000	4494	0.02304
FREEMAN CHEMICAL CORP	4182219	0	0.00000	57097	0.39627	57097	0	0.00000	57097	0.29277
G D SEARLE & CO	1188273	15379	0.31512	95106	0.66007	110485	0	0.00000	110485	0.56654
G FELSENTHAL & SONS INC	92925	9289	0.19030	16723	0.11606	26012	0	0.00000	26012	0.13338
G J ATCHER CO	109530	21900	0.44861	6704	0.04653	28604	0	0.00000	28604	0.14667
G. J. NICOLAS & CO.	207315	18894	0.38703	3672	0.02548	22566	0	0.00000	22566	0.11571
GARD INDUSTRIES INC	400895	0	0.00000	35987	0.24974	35987	0	0.00000	35987	0.18453
GAST MFG. CORPORATION	4215	421	0.00862	1318	0.00914	1739	0	0.00000	1739	0.00892

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BAYLORD PRODUCTS, INC.	1900	193	0.00375	349	0.00242	542	0	0.00000	542	0.00270
GENERAL AMERICAN TANKS	138145	0	0.00000	27627	0.19174	27627	0	0.00000	27627	0.14166
GENERAL ELECTRIC CO	193636	19364	0.37640	441	0.00306	19802	0	0.00000	19802	0.10154
GENERAL MILLS, INC.	17166	0	0.00000	1716	0.01191	1716	0	0.00000	1716	0.00880
GENERAL MOTORS ASSEMBLY	387304	38728	0.79331	0	0.00000	38728	3479	1.63981	42207	0.21642
GENERAL TIRE & RUBBER CO	573961	0	0.00000	114791	0.79669	114791	0	0.00000	114791	0.58860
GILTS BROTHERS MFG CO	5790	578	0.01184	1041	0.00722	1619	0	0.00000	1619	0.00830
GLIDDEN	629975	31489	0.64493	7528	0.05225	39017	1964	0.92644	40978	0.21012
GLIDDEN PAINT & VARNISH	34733	1733	0.03534	0	0.00000	1733	66	0.03111	1801	0.00923
GLIDDEN-DURKEE (DURIAN)	9997835	0	0.00000	1449586	11.44175	1449586	3464	1.63274	1453050	0.47098
GLIDDEN-DURKEE CO	1862927	93089	1.90686	2571	0.01704	95660	13286	6.26220	108946	0.55863
GLOBE COMPANY	6159	615	0.01260	1108	0.00769	1723	0	0.00000	1723	0.00883
GLOBE HAMILTON COLOR WORKS	190734	19067	0.39057	34326	0.23823	53393	0	0.00000	53393	0.27378
GO-CO., INC.	1499	149	0.00305	269	0.00187	418	0	0.00000	418	0.00214
GOTTLIEB CHEMICAL CO.	8580	858	0.01758	1544	0.01072	2402	0	0.00000	2402	0.01232
GRAHAM PAINT & VARNISH CO	547830	27340	0.56004	38310	0.26588	65650	644	0.30335	66294	0.33993
GRAIN PROCESSING CORP.	54000	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
GREAT LAKES EQUIP.	763	76	0.00156	137	0.00095	213	0	0.00000	213	0.00109
GREAT LAKES PLATING CO	4735	474	0.00971	856	0.00594	1330	0	0.00000	1330	0.00682
GREAT LAKES SOLVENT CO	300790	0	0.00000	45108	0.31306	45108	0	0.00000	45108	0.23129
GREAT LAKES TERMINAL	110884	0	0.00000	7761	0.05386	7761	0	0.00000	7761	0.03979
GRIFFITH LABORATORIES	7299	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
H J HELMERICH & SONS	1992	0	0.00000	199	0.00139	199	0	0.00000	199	0.00102

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H H HARPER	18687	0	0.00000	934	0.00648	934	0	0.00000	934	0.00479
H P SMITH PAPER CO	381824	30178	0.61817	0	0.00000	30178	0	0.00000	30178	0.15474
HAMILTON MFG COMPANY	333152	0	0.00000	70613	0.49008	70613	0	0.00000	70613	0.36207
HAUSER BEIBLE ASSOCIATION	10112	0	0.00000	596	0.00414	596	0	0.00000	596	0.00306
HAWKINS CHEMICAL	64600	0	0.00000	666	0.00462	666	0	0.00000	666	0.00341
HAWLEY PRODUCTS CO	292000	29200	0.59814	0	0.00000	29200	0	0.00000	29200	0.14972
HAYNES STELLITE CO	47422	4741	0.09712	8536	0.05924	13277	0	0.00000	13277	0.06808
HI TEMP INC	41554	4151	0.08503	7478	0.05190	11629	0	0.00000	11629	0.05963
HOAG CHEMICAL CORP.	18250	1825	0.03738	3285	0.02280	5110	0	0.00000	5110	0.02620
HOFFMAN SEMICONDUCTORS	4546	456	0.00934	821	0.00570	1277	0	0.00000	1277	0.00655
HONEYWELL INC.	24200	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
HOOKER PAINT & GLASS	36300	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
HOTPOINT	831585	0	0.00000	85165	0.59107	85165	0	0.00000	85165	0.43669
HOUFFLER FOUNDING CO	5000	500	0.01024	900	0.00625	1400	0	0.00000	1400	0.00718
HOUSTON CHEMICAL CO.	119948	11996	0.24573	21394	0.14987	33390	0	0.00000	33390	0.17223
HYDROSEL INC	499921	0	0.00000	18162	0.12605	18162	0	0.00000	18162	0.09313
ILLINOIS BRONZE POWDER	1282391	60096	1.23102	64799	0.44973	124895	3006	1.41696	127901	0.65582
ILLINOIS CENTRAL R.R.	8750	0	0.00000	875	0.00607	875	0	0.00000	875	0.00449
ILLINOIS METAL DECORATORS	25217	2519	0.05160	4537	0.03149	7056	0	0.00000	7056	0.03618
ILLINOIS PAINT WORKS	928342	46417	0.95082	176385	1.22417	222802	0	0.00000	222802	1.14243
ILLINOIS TOOL WORKS INC	951459	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
INLAND CHEMICAL CORP	4722	472	0.00967	850	0.00590	1322	0	0.00000	1322	0.00678
INLAND COATINGS & MFG.	11722	1172	0.02401	1055	0.00732	2227	0	0.00000	2227	0.01142

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INTERCHEMICAL CORP.	10833	1883	0.03857	1695	0.01176	3578	0	0.00000	3578	0.01835
INTERLAKE STEEL CORP.	16275	1627	0.03333	1464	0.01016	3091	0	0.00000	3091	0.01585
INTERNATIONAL HARVESTER	5496	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
INTERNATIONAL MINERALS & CHEM	99389	10571	0.21654	4672	0.03243	15243	0	0.00000	15243	0.07816
INTERNATIONAL NICKEL CORP	11235	1128	0.02296	2021	0.01403	3142	0	0.00000	3142	0.01611
INTERNATIONAL SHOE CORP	554188	0	0.00000	110837	0.76925	110837	0	0.00000	110837	0.56832
INTERNOYAL CORPORATION	40000	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
J A BITS PLASTIC CORP	435470	0	0.00000	68654	0.47648	68654	0	0.00000	68654	0.35203
J P BITS HOLDING CORP	564713	0	0.00000	108056	0.74993	108056	0	0.00000	108056	0.55406
J W MORTELL	68370	0	0.00000	405	0.00281	405	0	0.00000	405	0.00208
J. WILSON PLASTICS	476	47	0.00094	85	0.00059	132	0	0.00000	132	0.00068
J.T. CLARK CO.	12357	0	0.00000	627	0.00435	627	0	0.00000	627	0.00321
J.W. MORTELL	68360	0	0.00000	683	0.00474	683	0	0.00000	683	0.00350
JAYAR ROAD CHEMICAL	229459	0	0.00000	3030	0.02103	3030	0	0.00000	3030	0.01554
JOHNA WESTERN MILLS	3841209	882825	3.72865	377787	2.62197	529812	0	0.00000	529812	2.87047
JOHN M. GRACE CO.	6432	321	0.00650	0	0.00000	321	0	0.00000	321	0.00165
JOHN T CLARK CO	26382	0	0.00000	938	0.00651	938	0	0.00000	938	0.00481
JOHNSON WAX CO	291200	9189	0.18823	11476	0.08104	20665	0	0.00000	20665	0.10599
JULIAN ASSOCIATES INC	1202586	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
KALAMAZOO VEG. PARCH.	5027	502	0.01028	905	0.00639	1407	0	0.00000	1407	0.00721
KALMUS & ASSOCIATES	1782	0	0.00000	177	0.00125	177	0	0.00000	177	0.00091
KAPICA DRUM CLEANING	0	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
KAR-STELL TRUCK PAINTING	875	88	0.00180	161	0.00112	249	0	0.00000	249	0.00128

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KEIL CHEMICAL CO	971710	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
KELRAM CORP	63046	0	0.00000	1300	0.00902	1300	0	0.00000	1300	0.00667
KENMOTE LAMINATION	7644	762	0.01561	1376	0.00955	2138	0	0.00000	2138	0.01096
KENT PLASTICS	12305	1230	0.02520	2215	0.01537	3445	0	0.00000	3445	0.01766
KERR CHEMICALS INC	590300	12347	0.25292	3260	0.02263	15607	0	0.00000	15607	0.08003
KERR KNS COMPANIES INC.	20266	1013	0.02075	0	0.00000	1013	0	0.00000	1013	0.00519
KERR-MCGEE OIL INDUSTRIES	71562	0	0.00000	14312	0.09933	14312	0	0.00000	14312	0.07339
KNOWLES ELECTRONICS	1250049	0	0.00000	606	0.00421	606	0	0.00000	606	0.00311
KNS COMPANIES INC	136300	6810	0.13946	0	0.00000	6810	0	0.00000	6810	0.03496
KUEHNE MFG	84751	8490	0.17391	15286	0.10609	23776	0	0.00000	23776	0.12191
LAKE SALVAGE CO	25304	2533	0.05189	4567	0.03170	7100	0	0.00000	7100	0.03641
LAKEWAY CHEMICAL CO.	18500	1850	0.03790	3330	0.02311	5180	0	0.00000	5180	0.02656
LEECO PRODUCTS CO.	9075	907	0.01859	1633	0.01133	2540	0	0.00000	2540	0.01302
LEVIN & SONS INC	69520	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
LIBBY MCNEIL AND LIBBY	3375	339	0.00694	305	0.00212	644	0	0.00000	644	0.00330
LITHCOTE CORP	277092	9446	0.19349	20596	0.14294	30042	0	0.00000	30042	0.15404
LITTLEFUSE INC.	1970	197	0.00404	356	0.00247	553	0	0.00000	553	0.00284
LOCKFORMER	40000	8000	0.16387	0	0.00000	8000	0	0.00000	8000	0.04102
LONDON CHEMICAL CO	248223	0	0.00000	25596	0.17785	25596	0	0.00000	25596	0.13124
LUNUTS INDUSTRIES	90300	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
LUSTOUR CORP	362400	0	0.00000	72474	0.50299	72474	0	0.00000	72474	0.37161
MALLINCKRODT CHEMICAL	1323016	26449	0.54179	0	0.00000	26449	0	0.00000	26449	0.13562
MANTA VIN-COR STEEL	11632	1160	0.02376	2093	0.01453	3253	0	0.00000	3253	0.01669

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MARATHON (FOX RIVER)	245322	0	0.00000	43065	0.29809	43065	0	0.00000	43065	0.22082
MARATHON CORP	640444	0	0.00000	125410	0.87039	125410	0	0.00000	125410	0.64305
MARSON CHEMICAL	5430326	75693	1.55052	49444	0.34316	125137	0	0.00000	125137	0.64165
MARTIN MARTIN CO	1498297	74897	1.53421	53458	0.37102	128355	0	0.00000	128355	0.65815
MARTIN-MARIETTA CORP	214323	0	0.00000	42863	0.29748	42863	0	0.00000	42863	0.21978
MASTER BRONZE POWDER	164879	8336	0.17076	26127	0.18133	34463	0	0.00000	34463	0.17671
MATHESON-SELIG CO	37800	3776	0.07735	6800	0.04719	10576	0	0.00000	10576	0.05423
MATTHEWS PAINT CO	770030	39483	0.80878	69274	0.48079	108757	796	0.37519	109553	0.56174
MERIT CO	2100	210	0.00430	378	0.00262	588	0	0.00000	588	0.00302
METHODE ELECTRONICS INC	843667	0	0.00000	68278	0.47387	68278	0	0.00000	68278	0.35010
MEYERCORD COMPANY	5250	525	0.01075	945	0.00656	1470	0	0.00000	1470	0.00754
MID AMERICA PROTECTIVE COATING	67460	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
MID STATES CHEMICAL & SUPPLY	45244	0	0.00000	90	0.00062	90	0	0.00000	90	0.00046
MIDLAND INDUSTRIAL FINISHES	6442819	128794	2.63825	115324	0.80039	244118	0	0.00000	244118	1.25173
MIDLAND STEEL	14232	0	0.00000	212	0.00147	212	0	0.00000	212	0.00109
MIDWEST SINTERED PRODUCTS	232720	0	0.00000	11	0.00008	11	0	0.00000	11	0.00006
MILWAUKEE FERRO METALS	6583	658	0.01348	592	0.00411	1250	0	0.00000	1250	0.00641
MINERAL INDUSTRIES INC	33055	3305	0.06770	5950	0.04130	9255	0	0.00000	9255	0.04746
MIRAGOL INC	67773	0	0.00000	5593	0.03882	5593	0	0.00000	5593	0.02868
MIWAUKEE FERROMETAL	6497	649	0.01329	584	0.00405	1233	0	0.00000	1233	0.00632
MOBIL CHEMICAL CO	774679	38809	0.79497	97353	0.67566	136162	745	0.35115	136907	0.70200
MOBIL FINISHES INC.	21437	2143	0.04390	1929	0.01339	4072	0	0.00000	4072	0.02088
MOBILCRAFT WOOD [illegible].	[illegible]	0	0.0[illegible]	0	0.00000	0	0	0.00000	0	0.00000

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MONTGOMERY WARD	1354365	133825	2.74131	204702	1.42970	338527	534	0.25264	339061	1.73856
MONTINESTAR-PAISLEY	4774	479	0.00981	862	0.00598	1341	0	0.00000	1341	0.00688
MORTON CHEMICAL CO	343540	23876	0.48908	2401	0.01666	26277	0	0.00000	26277	0.13479
MOTOROLA INC	3567209	327634	6.71134	223339	1.55885	550973	0	0.00000	550973	2.82515
MUTER CO	4444	444	0.00910	800	0.00555	1244	0	0.00000	1244	0.00638
MUTSCHLER BROTHERS	9438	942	0.01930	1697	0.01178	2639	0	0.00000	2639	0.01353
NYCON INC	6634	661	0.01354	1193	0.00828	1854	0	0.00000	1854	0.00951
NATIONAL ADVERTISING	1446	146	0.00299	132	0.00092	278	0	0.00000	278	0.00143
NATIONAL CAN CO	1240477	62417	1.27857	0	0.00000	62417	0	0.00000	62417	0.32005
NATIONAL LACQUER & PAINT	487944	24374	0.49928	38069	0.26421	62443	534	0.25178	62977	0.32292
NATIONAL LOCK CO.	7330	735	0.01506	1323	0.00918	2058	0	0.00000	2058	0.01055
NILES CHEMICAL & PAINT	20653	0	0.00000	2065	0.01433	2065	0	0.00000	2065	0.01059
NIKIL LABORATORIES	22353	2234	0.04617	4079	0.02817	6313	0	0.00000	6313	0.03237
NORDSON INC	7840	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
NORTH CENTRAL CHEMICALS	89495	13897	0.28467	2804	0.01946	16701	0	0.00000	16701	0.08564
NUCLEAR CHICAGO CORP.	14177	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
O BRIEN CORP	213443	0	0.00000	24345	0.16896	24345	822	0.38745	25167	0.12903
O'NEIL RUBB CO	487760	0	0.00000	3230	0.02242	3230	0	0.00000	3230	0.01656
OPTO/GRAVITICS INC	23160	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ORGANIC INC	4994	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
OTT CHEMICAL COMPANY	67356	6732	0.13831	12159	0.08439	18911	0	0.00000	18911	0.09697
OWENS CORNING	276555	27652	0.55414	215	0.00149	27267	0	0.00000	27267	0.13981
PACKAGING INCS	734553	36706	0.75199	16266	0.11299	52972	0	0.00000	52972	0.27162

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PACKAGING LAMINATORS	111049	5583	0.11434	0	0.00000	5583	0	0.00000	5583	0.02863
PACKARD INSTRUMENTS	14165	1415	0.02899	2540	0.01760	3963	0	0.00000	3963	0.02032
PARCO PRODUCTS	3739775	0	0.00000	484334	3.36144	484334	0	0.00000	484334	2.48345
PARISIAN NOVELTY CO	47922	2373	0.04861	2781	0.01930	5154	0	0.00000	5154	0.02643
PAW PAW PLATING INC	59325	5930	0.12147	10676	0.07410	16606	0	0.00000	16606	0.08515
PEACOCK CLEANERS	1575	157	0.00322	283	0.00196	440	0	0.00000	440	0.00226
PEACOCK COLORS	2625	262	0.00537	472	0.00328	734	0	0.00000	734	0.00376
PELRON CORP	78936	7893	0.16168	14212	0.09864	22105	0	0.00000	22105	0.11334
PERFECTION TOOL & METAL	143207	0	0.00000	32394	0.22483	32394	0	0.00000	32394	0.16610
PERMACOLD INDUSTRIES	4270	426	0.00873	768	0.00533	1194	0	0.00000	1194	0.00612
PHILLIPS & MARTIN CO	84631	8463	0.17336	15237	0.10575	23700	0	0.00000	23700	0.12152
PIERCE & STEVENS CHEMICAL	109414	4216	0.08636	5012	0.03478	9228	0	0.00000	9228	0.04732
PIONEER PAINT	1463359	73142	1.49826	52282	0.36285	125424	2232	1.05204	127656	0.65456
PITTSBURGH PLATE GLASS	19642	1964	0.04023	3535	0.02453	5499	0	0.00000	5499	0.02820
PLAYSKOOL MFG CO	1407198	70345	1.44097	53570	0.37179	123915	0	0.00000	123915	0.63538
PODLITEMAN DIVISION OF DRESSER	55400	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
POLLACK (ST. REGIS) PAPER CO	138441	17602	0.36056	6127	0.04252	23729	0	0.00000	23729	0.12167
PRECISION SCIENTIFIC	25634	2553	0.05230	4608	0.03198	7161	0	0.00000	7161	0.03672
PREMIER PAINT & VARNISH	70400	7040	0.14421	0	0.00000	7040	0	0.00000	7040	0.03610
PRIME LEATHER PRODUCTS	306240	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
PRINTING PLATE SUPPLY CO	21500	2152	0.04409	0	0.00000	2152	0	0.00000	2152	0.01103
PROCTOR SILEX CORP	21770	0	0.00000	1581	0.01097	1581	0	0.00000	1581	0.00811
PRODUCERS TRANSFAST INC	[illegible]	4861	[illegible]	8752	[illegible]	13613	0	0.00000	13613	0.06980

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PYROXLIN PRODUCTS INC	76963	7895	0.15763	13833	0.09614	21548	0	0.00000	21548	0.11049
R.R. DONNELLEY AND SONS CO.	2569	256	0.00529	462	0.00321	718	0	0.00000	718	0.00368
RADIANT MFG CORP	11531	1155	0.02366	2079	0.01443	3234	0	0.00000	3234	0.01658
RADIO CORPORATION OF AMERICA	3025	0	0.00000	151	0.00105	151	0	0.00000	151	0.00077
RAYDAN CHEMICAL CO.	4166	416	0.00852	750	0.00521	1166	0	0.00000	1166	0.00598
REISON RICE	4725	472	0.00967	850	0.00590	1322	0	0.00000	1322	0.00678
REFINER'S TRANSPORT	4950	0	0.00000	99	0.00069	99	0	0.00000	99	0.00051
REICHHOLD CHEMICALS	66047	6604	0.13529	6563	0.04555	13167	0	0.00000	13167	0.06751
RELIABLE PASTE & DYE	97631	0	0.00000	1483	0.01029	1483	0	0.00000	1483	0.00760
RESLAC CHEMICALS INC.	20475	2047	0.04193	3685	0.02558	5732	0	0.00000	5732	0.02939
REVERE COPPER & BRASS	4630	463	0.00948	835	0.00580	1298	0	0.00000	1298	0.00666
REX STANDARD INC	5415	540	0.01106	649	0.00450	1189	0	0.00000	1189	0.00610
REXENE CHEMICAL CO	477635	0	0.00000	24843	0.17242	24843	0	0.00000	24843	0.12738
RHEEM MFG CO	281110	0	0.00000	44510	0.30891	44510	0	0.00000	44510	0.22823
RIVERDALE PLATING & HEAT	4513	451	0.00924	812	0.00564	1263	0	0.00000	1263	0.00648
ROACH APPLETON MFG CO	2901	289	0.00592	521	0.00362	810	0	0.00000	810	0.00415
ROBERT BOSING & CO	62580	0	0.00000	10155	0.07048	10155	0	0.00000	10155	0.05207
RODERS CARTAGE CO	483705	0	0.00000	3515	0.02440	3515	0	0.00000	3515	0.01802
ROLLPRINT PACKAGING	115713	11569	0.23698	0	0.00000	11569	0	0.00000	11569	0.05932
ROY SILKEN & CO (3 MO	1520157	75968	0.55615	0	0.00000	75968	0	0.00000	75968	0.38953
ROY WILSON MFG., CO.	10456	0	0.00000	1045	0.00725	1045	0	0.00000	1045	0.00536
RUBTEUM CORP	342043	0	0.00000	45397	0.31507	45397	226	0.10452	45623	0.23393
S C JOHNSON & SON	299276	10026	0.20539	0	0.00000	10026	0	0.00000	10026	0.05141

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S C JOHNSON WAX CO	1948293	25739	0.53134	55599	0.38588	81338	0	0.00000	81338	0.41809
SARGENT PAINT	44000	0	0.00000	0	0.00000	0	440	0.20739	440	0.00226
SATELLITE SERVICE	55670	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
SCHENKER CO	7377	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
SCIENTIFIC CHEMICAL	51030	0	0.00000	5103	0.03542	5103	0	0.00000	5103	0.02617
SCIENTIFIC OIL CO.	3715	371	0.00768	668	0.00464	1039	0	0.00000	1039	0.00533
SERVICE COATING	477166	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
SHAKEPROOF DIVISION ITW	155160	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
SHELLER GLOBE MFG CO	80499	8042	0.16514	14359	0.09966	22421	0	0.00000	22421	0.11496
SHERWIN WILLIAMS CO	19043237	344384	7.09542	1662363	11.53737	2008747	25935	12.22432	2034682	10.43293
SHIRLEY CORP	12134	1209	0.02477	2185	0.01516	3394	0	0.00000	3394	0.01740
SIDNEY A TARRSON	65199	0	0.00000	11850	0.08224	11850	0	0.00000	11850	0.06076
SINCLAIR & VALENTINE	410825	20536	0.42067	47903	0.33246	68439	0	0.00000	68439	0.35092
SMITH-VICTOR CORP	19723	1956	0.04007	3382	0.02347	5338	0	0.00000	5338	0.02737
SOUTH UNION OIL CO.	49333	4933	0.10105	8880	0.06163	13813	0	0.00000	13813	0.07083
SOUTHWEST TOOL AND MINE.	444	44	0.00090	80	0.00056	124	0	0.00000	124	0.00064
SPIRIT FLUIDS CORP	139982	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
ST CLAIR MFG CORP	476307	23816	0.48785	912	0.00633	24728	0	0.00000	24728	0.12679
ST LOUIS CASKET CO	1374	135	0.00277	246	0.00171	381	0	0.00000	381	0.00195
STANDARD CHEMICALS	61750	0	0.00000	3087	0.02142	3087	0	0.00000	3087	0.01583
STANDARD INDUSTRIAL	2019	201	0.00412	363	0.00252	564	0	0.00000	564	0.00289
STANDARD PACKAGING CORP	720330	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
STANDARD T CHEMICAL	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	0.00000	[illegible]	2.59217

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STARCRAFT CO	30000	0	0.00000	520	0.00346	520	0	0.00000	520	0.00270
STEEN RESIN & CHEMICAL	10214	1820	0.03720	3270	0.02275	5090	0	0.00000	5090	0.02614
STEPAN CHEMICAL CO	52976	5294	0.10844	9535	0.06618	14829	0	0.00000	14829	0.07684
STUART PAINT CO	111867	11182	0.22906	20137	0.13976	31319	0	0.00000	31319	0.16230
STYLETONE CO	10392	1037	0.02124	1869	0.01297	2906	0	0.00000	2906	0.01490
SULLIVAN VARNISH CO	5432	545	0.01157	1017	0.00706	1582	0	0.00000	1582	0.00811
SUN CHEMICAL CO	754933	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
SUPERIOR FINISHES	6600	0	0.00000	90	0.00060	90	0	0.00000	90	0.00050
SUPERIOR OIL CO	101900	3456	0.07079	583	0.00405	4039	0	0.00000	4039	0.02071
SUPERIOR PLASTICS	88041	4388	0.08988	2030	0.01409	6418	0	0.00000	6418	0.03291
SWIFT CHEMICAL CO	299224	4180	0.08562	46125	0.32012	50305	0	0.00000	50305	0.25794
SYNTHETIC RESINS	26250	0	0.00000	1312	0.00911	1312	0	0.00000	1312	0.00673
TAB CHEMICAL COMPANY	198076	19806	0.40571	6631	0.04602	26437	0	0.00000	26437	0.13556
TECHNICAL PETROLEUM CO	3833427	0	0.00000	340102	2.36042	340102	0	0.00000	340102	1.74389
TECHNICAL PRODUCTS CO	66666	0	0.00000	6666	0.04626	6666	0	0.00000	6666	0.03418
TEE PAK INC	219731	21971	0.45006	0	0.00000	21971	0	0.00000	21971	0.11266
TEXACO INC	16992	1699	0.03480	2422	0.01681	4121	0	0.00000	4121	0.02113
THANHARDT-BURGER CORP	9757	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
THE BORDEN COMPANY	225225	22520	0.46131	40538	0.28135	63058	0	0.00000	63058	0.32333
THE HUBB CO	173471	10662	0.21840	0	0.00000	10662	0	0.00000	10662	0.05467
THERMARK	212100	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
THERMO CHEMICAL	25455	2	0.00009	0	0.00000	0	0	0.00000	0	0.00000
THI[illegible]	[illegible]	26[illegible]	0.[illegible]	0	[illegible]	[illegible]	0	[illegible]	26[illegible]	0.13[illegible]

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THOMAS AMERICAN	72194	2204	0.04515	501	0.00340	2705	0	0.00000	2705	0.01387
THOMAS SOLVENTS	845537	3600	0.07538	52306	0.36302	55906	0	0.00000	55906	0.28707
THOMPSON-HAYWARD	690147	34497	0.70665	0	0.00000	34497	0	0.00000	34497	0.17709
TINGSTOL COMPANY	84924	8481	0.17373	15281	0.10606	23762	0	0.00000	23762	0.12196
TOP FLIGHT PRODUCTS CO.	1850	105	0.00215	189	0.00131	294	0	0.00000	294	0.00151
TRANSOCEAN COMPANY	8261	825	0.01690	1486	0.01031	2311	0	0.00000	2311	0.01185
TRANSPORT SERVICE CO.	42875	0	0.00000	8575	0.05951	8575	0	0.00000	8575	0.04397
TRW CINCH CONNECTOR	33000	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
TURNER MANUFACTURING CO	79787	7977	0.16340	5022	0.03485	12999	0	0.00000	12999	0.06665
U S MAGNETIC TAPE	76360	7634	0.15630	6872	0.04769	14506	0	0.00000	14506	0.07438
U S STEEL PRODUCTS	134640	13460	0.27562	0	0.00000	13460	0	0.00000	13460	0.07904
U S STEEL SUPPLY	449210	44917	0.92009	3945	0.02738	48862	0	0.00000	48862	0.25054
U.S. PAINT LACQUER & CHEMICAL	39097	3909	0.08007	7037	0.04884	10946	0	0.00000	10946	0.05613
U.S. PLATING & MFG CO	3150	315	0.00645	567	0.00394	882	0	0.00000	882	0.00452
UNION CARBIDE (VISKING)	337144	16844	0.34500	34340	0.23833	51186	0	0.00000	51186	0.26246
UNION CARBIDE LINDE	33805	3380	0.06924	3042	0.02111	6422	0	0.00000	6422	0.03293
UNITOTAL INC	42041	0	0.00000	2942	0.02042	2942	0	0.00000	2942	0.01509
URBAN CHEMICAL CO	54478	5445	0.11154	5518	0.03830	10963	0	0.00000	10963	0.05621
V J BOLAN COMPANY	56175	5617	0.11504	7961	0.05525	13578	0	0.00000	13578	0.06962
VALSPAR CORP	284413	12769	0.26366	35887	0.24907	48656	17	0.00801	48873	0.25060
VAPOR ENGINEERING	850773	85073	1.74266	0	0.00000	85073	0	0.00000	85073	0.43622
VARN PRODUCTS CORP.	1490	0	0.00000	149	0.00103	149	0	0.00000	149	0.00076
VARO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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VELSICOL CHEMICAL	895434	17906	0.36679	0	0.00000	17906	0	0.00000	17906	0.09101
VERO-LITE	3768	0	0.00000	23	0.00016	23	0	0.00000	23	0.00012
VICTORY OF CHICAGO	3347	334	0.00684	602	0.00418	936	0	0.00000	936	0.00480
VITAMINS INC	12335	0	0.00000	1994	0.01384	1994	0	0.00000	1994	0.01022
VULCAN CONTAINERS	44512	0	0.00000	1125	0.00781	1125	0	0.00000	1125	0.00577
VULCAN CORPORATION	60835	0	0.00000	12161	0.08440	12161	0	0.00000	12161	0.06236
W C RICHARDS CO	581781	14712	0.30136	56773	0.39402	71485	0	0.00000	71485	0.36654
W H MARNER CHEMICAL	170312	0	0.00000	10772	0.07476	10772	0	0.00000	10772	0.05523
W H PRAGER CO	3712	370	0.00758	666	0.00462	1036	0	0.00000	1036	0.00531
WEBB CHEMICAL CO	75789	7578	0.15523	9799	0.06801	17377	0	0.00000	17377	0.08910
WESCO SPRING CO.	3813	381	0.00417	271	0.00188	572	0	0.00000	572	0.00293
WESTERN ELECTRIC CO	56416	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
WESTERN PUBLISHING	27300	0	0.00000	330	0.00382	330	0	0.00000	330	0.00282
WESTINGHOUSE ELECTRIC	196277	19627	0.40204	35329	0.24520	54956	0	0.00000	54956	0.28179
WESTWAY PRODUCTS CO.	4750	475	0.00973	855	0.00593	1330	0	0.00000	1330	0.00682
WHEATON ENGINEERING CO	44888	4488	0.09603	8640	0.05858	13128	0	0.00000	13128	0.06731
WHIRLPOOL CORPORATION	1415409	29282	0.57934	82494	0.57254	110776	0	0.00000	110776	0.56801
WHITE ADVERTISING	83936	4182	0.08567	4031	0.02798	8213	0	0.00000	8213	0.04211
WHITTAKER CORP.	40000	0	0.00000	0	0.00000	0	0	0.00000	0	0.00000
WILLIAMS HAYWARD VARNISH	477067	47694	0.97658	40765	0.28292	88459	442	0.20833	88901	0.45584
WILLIAMS PAINT	90444	9044	0.18526	0	0.00000	9044	161	0.07589	9205	0.04720
WILSON LABORATORIES	22753	0	0.00000	1137	0.00789	1137	0	0.00000	1137	0.00583
WITCO CHEMICAL CO	240778	0	0.00000	21164	0.14689	21164	0	0.00000	21164	0.10851

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WOODSTOCK DIE CASTING	136000	13600	0.27839	0	0.00000	13600	0	0.00000	13600	0.06973
WORLD FIBERGLASS SUPPLY CO	206000	20600	0.42170	0	0.00000	20600	0	0.00000	20600	0.10563
ZARCO INDUSTRIAL FINISH	16800	1680	0.03441	3024	0.02099	4704	0	0.00000	4704	0.02412
ZEBERS INCORPORATED	406560	20328	0.41640	0	0.00000	20328	0	0.00000	20328	0.10423
ZENITH RADIO CORP (RAILROAD)	368758	36871	0.75520	0	0.00000	36871	0	0.00000	36871	0.18906
TOTALS	239119121	4881794	100.00000	14408241	100.00000	19278385	212159	100.00000	19582444	100.00000

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
MODEL CERCLA RD/RA CONSENT DECREE

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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF INDIANA

UNITED STATES OF AMERICA and STATE OF INDIANA Plaintiffs, v. AMERICAN CHEMICAL SERVICES, INC., et al, Defendants.	CIVIL ACTION NO.

CONSENT DECREE

I. BACKGROUND

A. The United States of America ("United States"), on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), filed a complaint in this matter pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606, 9607.

B. The United States in its complaint seeks, inter alia: (1) reimbursement of costs incurred by EPA and the Department of Justice for response actions at the American Chemical Services Superfund Site in Griffith, Indiana, together with accrued interest; and (2) performance of studies and response work by the Defendants at the Site consistent with the National Contingency Plan, 40 C.F.R. Part 300 (as amended) ("NCP").

C. In accordance with the NCP and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of Indiana (the "State") on _____, 1993 of negotiations with potentially responsible parties regarding the implementation of the remedial design and remedial action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to this Consent Decree.

D. The State of Indiana (the "State") has also filed a complaint against the defendants in this Court alleging that the defendants are liable to the State under Section 107 of CERCLA, 42 U.S.C. § 9607, and Indiana Code (IC) §§ 13-7-8.7-8 and 13-7-12 for (1) the reimbursement of response costs incurred by the State of Indiana for the American Chemical Services Superfund Site in Griffith, Indiana, together with accrued interest and (2) performance of studies and response work by Defendants at the Site consistent with the NCP.

E. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the Federal natural resource trustee(s) on _____, 19__ of negotiations with potentially responsible parties regarding the release of hazardous substances that may have resulted in injury to the natural resources under Federal trusteeship and encouraged the trustee(s) to participate in the negotiation of this Consent Decree.

F. The Defendants that have entered into this Consent Decree ("Settling Defendants") do not admit any liability to the

Plaintiffs arising out of the transactions or occurrences alleged in the complaints.

G. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register in September 1984.

H. In response to a release or a substantial threat of a release of a hazardous substance(s) at or from the Site, the Settling Defendants commenced in 1989 a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430.

I. The Settling Defendants completed a Remedial Investigation ("RI") Report in 1992, and the Settling Defendants completed a Feasibility Study ("FS") Report in 1992. The RI and the FS were supplemented by EPA.

J. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action on June 30, 1992, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

K. The decision by EPA on the remedial action to be implemented at the Site is embodied in a final Record of Decision

("ROD"), executed on September 30, 1992, on which the State concurred on or about September 28, 1992. The ROD includes a responsiveness summary to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA.

L. Based on the information presently available to EPA and the State, EPA and the State believe that the Work will be properly and promptly conducted by the Settling Defendants if conducted in accordance with the requirements of this Consent Decree and its appendices.

M. Solely for the purposes of Section 113(j) of CERCLA, the Remedial Action selected by the ROD and the Work to be performed by the Settling Defendants shall constitute a response action taken or ordered by the President.

N. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b). This Court also has personal jurisdiction over the Settling Defendants. Solely for the purposes

of this Consent Decree and the underlying complaints, Settling Defendants waive all objections and defenses that they may have to jurisdiction of the Court or to venue in this District. Settling Defendants shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

III. PARTIES BOUND

2. This Consent Decree applies to and is binding upon the United States and the State and upon Settling Defendants and their heirs, successors and assigns. Any change in ownership or corporate status of a Settling Defendant including, but not limited to, any transfer of assets or real or personal property shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

3. Settling Defendants shall provide a copy of this Consent Decree to each contractor hired to perform the Work (as defined below) required by this Consent Decree and to each person representing any Settling Defendant with respect to the Site or the Work and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Settling Defendants or their contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance with this Consent Decree. With regard to the activities undertaken pursuant to this Consent

Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

IV. DEFINITIONS

4. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

"Consent Decree" shall mean this Decree and all appendices attached hereto (listed in Section XXX). In the event of conflict between this Decree and any appendix, this Decree shall control.

"Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

"EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

"IDEM" shall mean the Indiana Department of Environmental Management and any successor departments or agencies.

"Itemized Cost Summary" shall mean the accounting statement provided to the Settling Defendants summarizing response costs incurred over a defined period.

"Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States or the State incur in reviewing or developing plans, reports and other items pursuant to this Consent Decree, verifying the Work, or otherwise implementing, overseeing, or enforcing this Consent Decree, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Sections VII, VIII, X (including, but not limited to, attorneys fees and the amount of just compensation), XVI, and Paragraph 83 of Section XXII. Future Response Costs shall also include all costs, including direct and indirect costs, paid by the United States and the State in connection with the Site between December 31, 1992 and the effective date of this Consent Decree and all interest on the Past Response Costs from December 31, 1992.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, including, but not limited to, any amendments thereto.

"Operation and Maintenance" or "O & M" shall mean all activities required to maintain the effectiveness of the Remedial

Action as required under the Operation and Maintenance Plan approved or developed by EPA pursuant to this Consent Decree and the Statement of Work (SOW).

"Owner Settling Defendants" shall mean the Settling Defendants listed in Appendix E.

"Paragraph" shall mean a portion of this Consent Decree identified by an arabic numeral or an upper case letter.

"Parties" shall mean the United States, the State of Indiana and the Settling Defendants.

"Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs and interest, that the United States or the State incurred and paid with regard to the Site prior to December 31, 1992.

"Performance Standards" shall mean those cleanup standards, standards of control, and other substantive requirements, criteria or limitations set forth in the ROD or Section II of the SOW.

"Plaintiffs" shall mean the United States and the State of Indiana.

"Pre-Design Work Plan" shall mean the document submitted by the settling Defendants pursuant to Paragraph 11.a. of this Consent Decree and described more fully in Paragraph 11.b.

"RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

"Record of Decision" or "ROD" shall mean the EPA Record of Decision relating to the Site signed on September 30, 1992, by the Regional Administrator, EPA Region 5, and all attachments thereto.

"Remedial Action" shall mean those activities, except for Operation and Maintenance, to be undertaken by the Settling Defendants to implement the final plans and specifications submitted by the Settling Defendants pursuant to the Remedial Design Work Plan and approved by EPA.

"Remedial Action Work Plan" shall mean the document submitted by the Settling Defendants pursuant to Paragraph 12.a of this Consent Decree and described more fully in Paragraph 12.b.

"Remedial Design" shall mean those activities to be undertaken by the Settling Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design Work Plan.

"Remedial Design Work Plan" shall mean the document submitted by the Settling Defendants pursuant to Paragraph 11.d of this Consent Decree and described more fully in Paragraph 11.e.

"Section" shall mean a portion of this Consent Decree identified by a roman numeral.

"Settling Defendants" shall mean those Parties identified in Appendices D (Non-Owner Settling Defendants) and E (Owner Settling Defendants).

"Site" shall mean the ACS Superfund site, encompassing approximately 36 total acres. The ACS Site is comprised of: 1) the American Chemical Services ("ACS") facility located at 420 S.

Colfax Avenue in Griffith, Lake County, Indiana; 2) the former Kapica Drum, Inc./Pazmey Corporation property, (collectively referred to as "Kapica/Pazmey") located adjacent to the ACS facility; and 3) the inactive portion of the Town of Griffith Landfill located adjacent to the ACS facility. A map of the ACS site is attached as Appendix A.

"State" shall mean the State of Indiana.

"Statement of Work" or "SOW" shall mean the statement of work for implementation of the Remedial Design, Remedial Action, and Operation and Maintenance at the Site, as set forth in Appendix B to this Consent Decree and any modifications made in accordance with this Consent Decree.

"Supervising Contractor" shall mean the principal contractor retained by the Settling Defendants to supervise and direct the implementation of the Work under this Consent Decree.

"United States" shall mean the United States of America.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14) and IC 13-7-8.7-1(c); (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. § 9601(33); and (3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

"Work" shall mean all activities Settling Defendants are required to perform under this Consent Decree, except those required by Section XXVI (Retention of Records).

V. GENERAL PROVISIONS

5. Objectives of the Parties

The objectives of the Parties in entering into this Consent Decree are to protect public health or welfare or the environment at the Site by the design and implementation of response actions at the Site by the Settling Defendants and to reimburse response costs of the Plaintiffs.

6. Commitments by Settling Defendants

a. Settling Defendants shall finance and perform the Work in accordance with this Consent Decree and all plans, standards, specifications, and schedules set forth in or developed and approved by EPA, after providing the State with a reasonable opportunity to review and comment, pursuant to this Consent Decree. Settling Defendants shall also reimburse the United States and the State for Past Response Costs and Future Response Costs as provided in this Consent Decree.

b. The obligations of Settling Defendants to finance and perform the Work and to pay amounts owed the United States and the State under this Consent Decree are joint and several. In the event of the insolvency or other failure of any one or more Settling Defendants to implement the requirements of this Consent Decree, the remaining Settling Defendants shall complete all such requirements.

7. Compliance With Applicable Law

All activities undertaken by Settling Defendants pursuant to this Consent Decree shall be performed in accordance with the

requirements of all applicable federal and state laws and regulations. Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all Federal and state environmental laws as set forth in the ROD and the SOW. The activities conducted pursuant to this Consent Decree, if approved by EPA, shall be considered to be consistent with the NCP.

8. Permits

a. As provided in Section 121(e) of CERCLA and §300.5 of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site. Where any portion of the Work requires a federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. The Settling Defendants may seek relief under the provisions of Section XIX (Force Majeure) of this Consent Decree for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit required for the Work.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

9. Notice of Obligations to Successors-in-Title

a. Within 15 days after the entry of this Consent Decree, the Owner Settling Defendant(s) shall record a certified copy of this Consent Decree with the Recorder's Office, Lake County, State of Indiana. Thereafter, each deed, title, or other

instrument conveying an interest in the property included in the Site shall contain a notice stating that the property is subject to this Consent Decree and any liens retained by the United States or the State and shall reference the recorded location of the Consent Decree and any restrictions applicable to the property under this Consent Decree.

b. The obligations of each Owner Settling Defendant with respect to the provision of access under Section X (Access) and the implementation of institutional controls shall be binding upon any and all such Settling Defendants and any and all persons who subsequently acquire any such interest or portion thereof (hereinafter "Successors-in-Title"). Within 15 days after the entry of this Consent Decree, each Owner Settling Defendant shall record at the Recorder's Office a notice of obligation to provide access under Section X (Access) and related covenants. Each subsequent instrument conveying an interest to any such property included in the Site shall reference the recorded location of such notice and covenants applicable to the property.

c. Any Owner Settling Defendant and any Successor-in-Title shall, at least 30 days prior to the conveyance of any such interest, give written notice of this Consent Decree to the grantee and written notice to EPA and the State of the proposed conveyance, including the name and address of the grantee, and the date on which notice of the Consent Decree was given to the grantee. In the event of any such conveyance, the Settling Defendants' obligations under this Consent Decree, including their obligations

to provide or secure access pursuant to Section X, shall continue to be met by the Settling Defendants. In addition, if the United States and the State approve, the grantee may perform some or all of the Work under this Consent Decree. In no event shall the conveyance of an interest in property that includes, or is a portion of, the Site release or otherwise affect the liability of the Settling Defendants to comply with the Consent Decree.

VI. PERFORMANCE OF THE WORK BY SETTLING DEFENDANTS

10. Selection of Supervising Contractor.

a. All aspects of the Work to be performed by Settling Defendants pursuant to Sections VI (Performance of the Work by Settling Defendants), VII (Additional Response Actions), VIII (U.S. EPA Periodic Review), and IX (Quality Assurance, Sampling and Data Analysis) of this Consent Decree shall be under the direction and supervision of the Supervising Contractor, the selection of which shall be subject to disapproval by EPA, after reasonable opportunity for review and comment by the State. Within 10 days after the lodging of this Consent Decree, Settling Defendants shall notify EPA and the State in writing of the name, title, and qualifications of any contractor proposed to be the Supervising Contractor. EPA will issue a notice of disapproval or an authorization to proceed. If at any time thereafter, Settling Defendants propose to change a Supervising Contractor, Settling Defendants shall give such notice to EPA and the State and must obtain an authorization to proceed from EPA, after reasonable opportunity for review and comment by the State, before the new

Supervising Contractor performs, directs, or supervises any Work under this Consent Decree.

b. If EPA disapproves a proposed Supervising Contractor, EPA will notify Settling Defendants in writing. Settling Defendants shall submit to EPA and the State a list of contractors, including the qualifications of each contractor, that would be acceptable to them within 30 days of receipt of EPA's disapproval of the contractor previously proposed. EPA, after reasonable opportunity for review and comment by the State, will provide written notice of the names of any contractor(s) that it disapproves and an authorization to proceed with respect to any of the other contractors. Settling Defendants may select any contractor from that list that is not disapproved and shall notify EPA and the State of the name of the contractor selected within 21 days of EPA's authorization to proceed.

c. If EPA fails to provide written notice of its authorization to proceed or disapproval as provided in this Paragraph and this failure prevents the Settling Defendants from meeting one or more deadlines in a plan approved by the EPA pursuant to this Consent Decree, Settling Defendants may seek relief under the provisions of Section XIX (Force Majeure) hereof.

11. Remedial Design.

a. Within 60 days after issuance of an authorization to proceed pursuant to Paragraph 10, Settling Defendants shall submit to EPA and the State a work plan for the pre-design work at the Site ("Pre-Design Work Plan"). The Pre-Design Work Plan shall

provide for performing pre-design studies to supplement the available technical data necessary to fully implement the Remedial Design and Remedial Action and shall initiate certain aspects of the remedy set forth in the ROD in accordance with the SOW and, upon its approval by EPA, shall be incorporated into and become enforceable under this Consent Decree. Within 30 days after EPA's issuance of an authorization to proceed, the Settling Defendants shall submit to EPA and the State a Health and Safety Plan for field pre-design activities which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The Pre-Design Work Plan shall include plans and schedules for implementation of all pre-design tasks identified in the SOW, including, but not limited to, plans and schedules for the completion of: (1) perimeter fence installation; (2) Excavation and offsite disposal for intact buried drums in the On-site Containment Area; (3) Wetland investigations; (4) Identification of compliance and detection monitoring wells; (5) Residential well sampling program (including possible well closures and ground water use advisories); (6) In-situ Vapor Extraction Pilot Study for On-site Area Buried Wastes; (7) Treatability studies; (8) Lead cleanup level refinement; (9) design sampling and analysis plan (including, but not limited to, a Pre-Design Quality Assurance Project Plan (PD QAPP) in accordance with Section IX (Quality Assurance, Sampling and Data Analysis)); and (9) a Pre-Design Report. In addition, the

Pre-Design Work Plan shall include a schedule for completion of the Remedial Design Work Plan.

c. Upon approval of the Pre-Design Work Plan by EPA, after a reasonable opportunity for review and comment by the State, and submittal of the Health and Safety Plan for all field activities to EPA and the State, Settling Defendants shall implement the Pre-Design Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals and other deliverables required under the approved Pre-Design Work Plan in accordance with the approved schedule for review and approval pursuant to Section XII (Submissions Requiring Agency Approval). Unless otherwise directed by EPA, Settling Defendants shall not commence further Remedial Design activities at the Site prior to approval of the Pre-Design Work Plan.

d. Within 30 days after the approval of the final Pre-Design Work Plan, Settling Defendants shall submit to EPA and the State a work plan for the design of the Remedial Action at the Site ("Remedial Design Work Plan"). The Remedial Design Work Plan shall provide for design of the remedy set forth in the ROD in accordance with the SOW and, upon its approval by EPA, shall be incorporated into and become enforceable under this Consent Decree. Within 45 days after the approval of the final pre-design submittal, the Settling Defendants shall submit to EPA and the State a Health and Safety Plan for field design activities which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

e. The Remedial Design Work Plan shall include plans and schedules for implementation of all remedial design tasks identified in the SOW, including, but not limited to, plans and schedules for the completion of: (1) design sampling and analysis plan (including, but not limited to, a Remedial Design Quality Assurance Project Plan (RD QAPP) in accordance with Section IX (Quality Assurance, Sampling and Data Analysis)); (2) a preliminary design submittal; (3) an intermediate design submittal; (4) a pre-final/final design submittal; and (5) a Construction Quality Assurance Plan. In addition, the Remedial Design Work Plan shall include a schedule for completion of the Remedial Action Work Plan.

f. Upon approval of the Remedial Design Work Plan by EPA, after a reasonable opportunity for review and comment by the State, and submittal of the Health and Safety Plan for all field activities to EPA and the State, Settling Defendants shall implement the Remedial Design Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals and other deliverables required under the approved Remedial Design Work Plan in accordance with the approved schedule for review and approval pursuant to Section XII (Submissions Requiring Agency Approval). Unless otherwise directed by EPA, Settling Defendants shall not commence further Remedial Design activities at the Site prior to approval of the Remedial Design Work Plan.

g. The preliminary design submittal shall include, at a minimum, the following: (1) design criteria; (2) results of treatability studies; (3) results of additional field sampling and

pre-design work; (4) project delivery strategy; (5) preliminary plans, drawings and sketches; (6) required specifications in outline form; and (7) preliminary construction schedule.

h. The intermediate design submittal shall be a continuation and expansion of the preliminary design. Any value engineering proposals must be identified and evaluated during this review.

i. The pre-final/final design submittal shall include, at a minimum, the following: (1) final plans and specifications; (2) Operation and Maintenance Plan; (3) Construction Quality Assurance Project Plan (CQAPP); (4) Field Sampling Plan (directed at measuring progress towards meeting Performance Standards); and (5) Contingency Plan. The CQAPP, which shall detail the approach to quality assurance during construction activities at the Site, shall specify a quality assurance official ("QA Official"), independent of the Supervising Contractor, to conduct a quality assurance program during the construction phase of the project.

12. Remedial Action.

a. Within 30 days after approval of the final design submittal, Settling Defendants shall submit to EPA and the State, a work plan for the performance of the Remedial Action at the Site ("Remedial Action Work Plan"). The Remedial Action Work Plan shall provide for construction of the remedy, in accordance with the SOW and the design plans and specifications in the approved final design submittal. Upon its approval by EPA, after reasonable opportunity for review and comment by the State, the Remedial

Action Work Plan shall be incorporated into and become enforceable under this Consent Decree. At the same time as they submit the Remedial Action Work Plan, Settling Defendants shall submit to EPA and the State a Health and Safety Plan for field activities required by the Remedial Action Work Plan which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The Remedial Action Work Plan shall include the following: (1) the schedule for completion of the Remedial Action; (2) method for selection of the contractor; (3) schedule for developing and submitting other required Remedial Action plans; (4) methodology for implementation of the Construction Quality Assurance Plan; (5) a groundwater monitoring plan; (6) methods for satisfying permitting requirements; (7) methodology for implementation of the Operation and Maintenance Plan; (8) methodology for implementation of the Contingency Plan; (9) construction quality control plan (by constructor); and (10) procedures and plans for the decontamination of equipment and the disposal of contaminated materials. The Remedial Action Work Plan also shall include a schedule for implementation of all Remedial Action tasks identified in the final design submittal and shall identify the initial formulation of the Settling Defendants' Remedial Action Project Team (including, but not limited to, the Supervising Contractor).

c. Upon approval of the Remedial Action Work Plan by EPA, after a reasonable opportunity for review and comment by the

State, Settling Defendants shall implement the activities required under the Remedial Action Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals, or other deliverables required under the approved Remedial Action Work Plan in accordance with the approved schedule for review and approval pursuant to Section XII (Submissions Requiring Agency Approval). Unless otherwise directed by EPA, Settling Defendants shall not commence physical on-Site activities at the Site prior to approval of the Remedial Action Work Plan.

13. The Work performed by the Settling Defendants pursuant to this Consent Decree shall include the obligation to achieve the Performance Standards.

14. Settling Defendants acknowledge and agree that nothing in this Consent Decree, the SOW, the Pre-Design Work Plan, the Remedial Design Work Plan, or the Remedial Action Work Plans constitutes a warranty or representation of any kind by Plaintiffs that compliance with the work requirements set forth in the SOW and the Work Plans will achieve the Performance Standards. Settling Defendants' compliance with the work requirements shall not foreclose Plaintiffs from seeking compliance with all terms and conditions of this Consent Decree, including, but not limited to, the applicable Performance Standards.

15. Settling Defendants shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving

facility's state and to the EPA Project Coordinator of such shipment of Waste Material. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

a. The Settling Defendants shall include in the written notification the following information, where available: (1) the name and location of the facility to which the Waste Material are to be shipped; (2) the type and quantity of the Waste Material to be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. The Settling Defendants shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state will be determined by the Settling Defendants following the award of the contract for Remedial Action construction. The Settling Defendants shall provide the information required by Paragraph 15.a as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

VII. ADDITIONAL RESPONSE ACTIONS

16. In the event that EPA, after consultation with the State, determines or the Settling Defendants propose that additional response actions are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD, notification of such

additional response actions shall be provided to the Project Coordinator for the other party(ies).

17. Within 30 days of receipt of notice from EPA or Settling Defendants pursuant to Paragraph 16 that additional response actions are necessary (or such longer time as may be specified by EPA), Settling Defendants shall submit for approval by EPA, after reasonable opportunity for review and comment by the State, a work plan for the additional response actions. The plan shall conform to the applicable requirements of Paragraphs 11 and 12. Upon approval of the plan pursuant to Section XII (Submissions Requiring Agency Approval), Settling Defendants shall implement the plan for additional response actions in accordance with the schedule contained therein.

18. Any additional response actions that Settling Defendants propose are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD shall be subject to approval by EPA, after reasonable opportunity for review and comment by the State, and, if authorized by EPA, shall be completed by Settling Defendants in accordance with plans, specifications, and schedules approved or established by EPA pursuant to Section XII (Submissions Requiring Agency Approval).

19. Settling Defendants may invoke the procedures set forth in Section XX (Dispute Resolution) to dispute EPA's determination that additional response actions are necessary to meet the Performance Standards or to carry out the remedy selected in the

ROD. Such a dispute shall be resolved pursuant to Paragraphs 62-65 of this Consent Decree.

VIII. EPA PERIODIC REVIEW

20. Settling Defendants shall conduct any studies and investigations as requested by EPA in order to permit EPA to conduct reviews at least every five years as required by Section 121(c) of CERCLA and any applicable regulations.

21. If required by Sections 113(k)(2) or 117 of CERCLA, Settling Defendants and the public will be provided with an opportunity to comment on any further response actions proposed by EPA as a result of the review conducted pursuant to Section 121(c) of CERCLA and to submit written comments for the record during the public comment period. After the period for submission of written comments is closed, the Regional Administrator, EPA Region 5, or his/her delegate will determine in writing whether further response actions are appropriate.

22. If the Regional Administrator, EPA Region 5, or his/her delegate determines that information received, in whole or in part, during the review conducted pursuant to Section 121(c) of CERCLA, indicates that the Remedial Action is not protective of human health and the environment, the Settling Defendants shall undertake any further response actions EPA, after consultation with the State, has determined are appropriate, unless their liability for such further response actions is barred by the Covenant Not to Sue set forth in Section XXII. Settling Defendants shall submit a plan for such work to EPA for approval, in accordance with the

procedures set forth in Section VI (Performance of the Work by Settling Defendants) and shall implement the plan approved by EPA, after reasonable opportunity for review and comment by the State. The Settling Defendants may invoke the procedures set forth in Section XX (Dispute Resolution) to dispute (1) EPA's determination that the remedial action is not protective of human health and the environment, (2) EPA's selection of the further response actions ordered as arbitrary and capricious or otherwise not in accordance with law, or (3) EPA's determination that the Settling Defendant's liability for the further response actions requested is reserved in Paragraphs 80, 81, or 83 or otherwise not barred by the Covenant Not to Sue set forth in Section XXII.

IX. QUALITY ASSURANCE, SAMPLING, and DATA ANALYSIS

23. Settling Defendants shall use quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance and monitoring samples in accordance with EPA's "Interim Guidelines and Specifications For Preparing Quality Assurance Project Plans," December 1980, (QAMS-005/80); "Data Quality Objective Guidance," (EPA/540/G87/003 and 004); "EPA NEIC Policies and Procedures Manual," May 1978, revised November 1984, (EPA 330/9-78-001-R); and subsequent amendments to such guidelines upon notification by EPA to Settling Defendants of such amendment. Amended guidelines shall apply only to procedures conducted after such notification. Prior to the commencement of any monitoring project under this Consent Decree, Settling Defendants shall submit to EPA for approval, after a reasonable opportunity for review and

comment by the State, a Quality Assurance Project Plan ("QAPP") to EPA and the State that is consistent with the SOW, the NCP and applicable guidance documents. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP(s) and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Decree. Settling Defendants shall ensure that EPA and State personnel and their authorized representatives are allowed access at reasonable times to all laboratories utilized by Settling Defendants in implementing this Consent Decree. In addition, Settling Defendants shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring. Settling Defendants shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the "Contract Lab Program Statement of Work for Inorganic Analysis" and the "Contract Lab Program Statement of Work for Organic Analysis," dated February 1988, and any amendments made thereto during the course of the implementation of this Decree. Settling Defendants shall ensure that all laboratories they use for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent QA/QC program.

24. Upon request, the Settling Defendants shall allow split or duplicate samples to be taken by EPA and the State or their

authorized representatives. Settling Defendants shall notify EPA and the State not less than 28 days in advance of any sample collection activity unless shorter notice is agreed to by EPA. In addition, EPA and the State shall have the right to take any additional samples that EPA or the State deem necessary. Upon request, EPA and the State shall allow the Settling Defendants to take split or duplicate samples of any samples it takes as part of the Plaintiffs' oversight of the Settling Defendant's implementation of the Work.

25. Settling Defendants shall submit to EPA and the State three (3) copies each of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Settling Defendants with respect to the Site and/or the implementation of this Consent Decree unless EPA agrees otherwise.

26. Notwithstanding any provision of this Consent Decree, the United States and the State hereby retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA and any other applicable statutes or regulations.

X. ACCESS

27. Commencing upon the date of lodging of this Consent Decree, the Settling Defendants agree to provide the United States, the State, and their representatives, including EPA and its contractors, access at all reasonable times to the Site and any other property to which access is required for the implementation of this Consent Decree, to the extent access to the property is

controlled by Settling Defendants, for the purposes of conducting any activity related to this Consent Decree including, but not limited to:

a. Monitoring the Work;

b. Verifying any data or information submitted to the United States;

c. Conducting investigations relating to contamination at or near the Site;

d. Obtaining samples;

e. Assessing the need for, planning, or implementing additional response actions at or near the Site;

f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents, consistent with Section XXV; and

g. Assessing Settling Defendants' compliance with this Consent Decree.

28. To the extent that the Site or any other property to which access is required for the implementation of this Consent Decree is owned or controlled by persons other than Settling Defendants, Settling Defendants shall use best efforts to secure from such persons access for Settling Defendants, as well as for the United States and the State and their representatives, including, but not limited to, their contractors, as necessary to effectuate this Consent Decree. For purposes of this Paragraph "best efforts" includes the payment of reasonable sums of money in consideration of access. If any access required to complete the

Work is not obtained within 45 days of the date of lodging of this Consent Decree, or within 45 days of the date EPA notifies the Settling Defendants in writing that additional access beyond that previously secured is necessary, Settling Defendants shall promptly notify the United States and the State, and shall include in that notification a summary of the steps Settling Defendants have taken to attempt to obtain access. The United States or the State may, as it deems appropriate, assist Settling Defendants in obtaining access. Settling Defendants shall reimburse the United States or the State, in accordance with the procedures in Section XVII (Reimbursement of Response Costs), for all costs incurred by the United States or the State in obtaining access.

29. Notwithstanding any provision of this Consent Decree, the United States and the State retain all of its access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

XI. REPORTING REQUIREMENTS

30. In addition to any other requirement of this Consent Decree, Settling Defendants shall submit to EPA and the State three (3) copies each of written monthly progress reports that: (a) describe the actions which have been taken toward achieving compliance with this Consent Decree during the previous month; (b) include a summary of all results of sampling and tests and all other data received or generated by Settling Defendants or their contractors or agents in the previous month; (c) identify all work plans, plans and other deliverables required by this Consent Decree

completed and submitted during the previous month; (d) describe all actions, including, but not limited to, data collection and implementation of work plans, which are scheduled for the next six weeks and provide other information relating to the progress of construction, including, but not limited to, critical path diagrams, Gantt charts and Pert charts; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays; (f) include any modifications to the work plans or other schedules that Settling Defendants have proposed to EPA or that have been approved by EPA; and (g) describe all activities undertaken in support of the Community Relations Plan during the previous month and those to be undertaken in the next six weeks. Settling Defendants shall submit these progress reports to EPA and the State by the tenth day of every month following the lodging of this Consent Decree until EPA notifies the Settling Defendants pursuant to Paragraph 48.b of Section XV (Certification of Completion). If requested by EPA or the State, Settling Defendants shall also provide briefings for EPA and the State to discuss the progress of the Work.

31. The Settling Defendants shall notify EPA and the State of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, data collection and implementation of work plans, no later than seven days prior to the performance of the activity.

32. Upon the occurrence of any event during performance of the Work that Settling Defendants are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA) or 329 IAC 3.1-9, Settling Defendants shall within 24 hours of the onset of such event orally notify the EPA and the IDEM Project Coordinators or the Alternate EPA and IDEM Project Coordinators (in the event of the unavailability of the EPA and IDEM Project Coordinators), or, in the event that neither the EPA Project Coordinator or Alternate EPA Project Coordinator is available, the Emergency Response Section, Region 5, United States Environmental Protection Agency. These reporting requirements are in addition to the reporting required by CERCLA Section 103, EPCRA Section 304, and 329 IAC 3.1-9.

33. Within 20 days of the onset of such an event, Settling Defendants shall furnish to Plaintiffs a written report, signed by the Settling Defendant's Project Coordinator, setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Within 30 days of the conclusion of such an event, Settling Defendants shall submit a report setting forth all actions taken in response thereto.

34. Settling Defendants shall submit 14 copies, or such number as the EPA Project Coordinator may designate, of all plans, reports, and data required by the SOW, the Pre-Design Work Plan, the Remedial Design Work Plan, the Remedial Action Work Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans. Settling Defendants shall simultaneously

submit 10 copies, or such number as the State Project Coordinator may designate, of all such plans, reports and data to the State.

35. All reports and other documents submitted by Settling Defendants to EPA and the State (other than the monthly progress reports referred to above) which purport to document Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendants.

XII. SUBMISSIONS REQUIRING AGENCY APPROVAL

36. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Decree, EPA, after reasonable opportunity for review and comment by the State, shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that the Settling Defendants modify the submission; or (e) any combination of the above.

37. In the event of approval, approval upon conditions, or modification by EPA, pursuant to Paragraph 36(a), (b), or (c), Settling Defendants shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA subject only to their right to invoke the Dispute Resolution procedures set forth in Section XX (Dispute Resolution) with respect to the modifications or conditions made by EPA. In the event that EPA modifies the submission to cure the deficiencies pursuant to Paragraph 36(c) and the submission has a material

defect, EPA and the State retain their rights to seek stipulated penalties, as provided in Section XXI.

38. a. Upon receipt of a notice of disapproval pursuant to Paragraph 36(d), Settling Defendants shall, within 14 days or such other time as specified by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XXI, shall accrue during the 14-day period or otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Paragraph 39.

b. Notwithstanding the receipt of a notice of disapproval pursuant to Paragraph 36(d), Settling Defendants shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve Settling Defendants of any liability for stipulated penalties under Section XXI (Stipulated Penalties).

39. In the event that a resubmitted plan, report or other item, or portion thereof, is disapproved by EPA, after reasonable opportunity for review and comment by the State, EPA may again require the Settling Defendants to correct the deficiencies, in accordance with the preceding Paragraphs. EPA, after reasonable opportunity for review and comment by the State, also retains the right to amend or develop the plan, report or other item. Settling Defendants shall implement any such plan, report, or item as

amended or developed by EPA, subject only to their right to invoke the procedures set forth in Section XX (Dispute Resolution).

40. If upon resubmission, a plan, report, or item is disapproved or modified by EPA due to a material defect, Settling Defendants shall be deemed to have failed to submit such plan, report, or item timely and adequately unless the Settling Defendants invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution) and EPA's action is overturned pursuant to that Section. The provisions of Section XX (Dispute Resolution) and Section XXI (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during Dispute Resolution. If EPA's disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XXI.

41. All plans, reports, and other items required to be submitted to EPA and the State under this Consent Decree shall, upon approval or modification by EPA, after reasonable opportunity for review and comment by the State, be enforceable under this Consent Decree. In the event EPA approves or modifies a portion of a plan, report, or other item required to be submitted to EPA and the State under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree.

XIII. PROJECT COORDINATORS

42. Within 20 days of lodging this Consent Decree, Settling Defendants, the State and EPA will notify each other, in writing,

of the name, address and telephone number of their respective designated Project Coordinators and Alternate Project Coordinators. If a Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor will be given to the other parties at least 5 working days before the changes occur, unless impracticable, but in no event later than the actual day the change is made. The Settling Defendants' Project Coordinator shall be subject to disapproval by EPA, after reasonable opportunity for review and comment by the State, and shall have the technical expertise sufficient to adequately oversee all aspects of the Work. The Settling Defendants' Project Coordinator shall not be an attorney for any of the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

43. Plaintiffs may designate other representatives, including, but not limited to, EPA and State employees, and federal and State contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Project Coordinator and Alternate Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager (RPM) and an On-Scene Coordinator (OSC) by the National Contingency Plan, 40 C.F.R. Part 300. In addition, EPA's Project Coordinator or Alternate Project Coordinator shall have authority, consistent with the National Contingency Plan, to halt

any Work required by this Consent Decree and to take any necessary response action when s/he determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

44. The Project Coordinators for EPA and IDEM and the Settling Defendants will meet, at a minimum, on a monthly basis.

XIV. ASSURANCE OF ABILITY TO COMPLETE WORK

45. Within 30 days of entry of this Consent Decree, Settling Defendants shall establish and maintain financial security in the amount of $46.8 million in one of the following forms:

(a) A surety bond guaranteeing performance of the Work;

(b) One or more irrevocable letters of credit equalling the total estimated cost of the Work;

(c) A trust fund;

(d) A guarantee to perform the Work by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with at least one of the Settling Defendants; or

(e) A demonstration that one or more of the Settling Defendants satisfy the requirements of 40 C.F.R. Part 264.143(f) and 329 IAC 3.1-14-9.

46. If the Settling Defendants seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 45(d) of this Consent Decree, Settling Defendants shall demonstrate that the guarantor satisfies the

requirements of 40 C.F.R. Part 264.143(f). If Settling Defendants seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 45(d) or (e), they shall resubmit sworn statements conveying the information required by 40 C.F.R. Part 264.143(f) annually, on the anniversary of the effective date of this Consent Decree. In the event that EPA, after a reasonable opportunity for review and comment by the State, determines at any time that the financial assurances provided pursuant to this Section are inadequate, Settling Defendants shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for approval, with a copy to the State, one of the other forms of financial assurance listed in Paragraph 45 of this Consent Decree. Settling Defendants' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Consent Decree.

XV. CERTIFICATION OF COMPLETION

47. Completion of the Remedial Action

a. Within 90 days after Settling Defendants conclude that the Remedial Action has been fully performed and the Performance Standards have been attained, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants, and EPA and the State. If, after the pre-certification inspection, the Settling Defendants still believe that the Remedial Action has been fully performed and the Performance Standards have been attained, they shall submit a

written report requesting certification to EPA for approval, with a copy to the State, pursuant to Section XII (Submissions Requiring Agency Approval) within 30 days of the inspection. In the report, a registered professional engineer and the Settling Defendants' Project Coordinator shall state that the Remedial Action has been completed in full satisfaction of the requirements of this Consent Decree. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

> "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after completion of the pre-certification inspection and receipt and review of the written report, EPA, after reasonable opportunity to review and comment by the State, determines that the Remedial Action or any portion thereof has not been completed in accordance with this Consent Decree or that the Performance Standards have not been achieved, EPA will notify Settling Defendants in writing of the activities that must be undertaken to complete the Remedial Action and achieve the Performance Standards. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for

approval pursuant to Section XII (Submissions Requiring Agency Approval). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established pursuant to this Paragraph, subject to their right to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent report requesting Certification of Completion and after a reasonable opportunity for review and comment by the State, that the Remedial Action has been fully performed in accordance with this Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to Settling Defendants. This certification shall constitute the Certification of Completion of the Remedial Action for purposes of this Consent Decree, including, but not limited to, Section XXII (Covenants Not to Sue by Plaintiffs). Certification of Completion of the Remedial Action shall not affect Settling Defendants' obligations under this Consent Decree.

48. Completion of the Work

a. Within 90 days after Settling Defendants conclude that all phases of the Work (including O & M), have been fully performed, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants, and EPA and the State. If, after the pre-certification inspection, the Settling Defendants still believe that the Work has been fully performed, Settling Defendants shall submit a written report by a

registered professional engineer stating that the Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

> "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after review of the written report, EPA, after reasonable opportunity to review and comment by the State, determines that any portion of the Work has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendants in writing of the activities that must be undertaken to complete the Work. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XII (Submissions Requiring Agency Approval). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion by Settling Defendants and after a reasonable opportunity for review and

comment by the State, that the Work has been fully performed in accordance with this Consent Decree, EPA will so notify the Settling Defendants in writing.

XVI. EMERGENCY RESPONSE

49. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Settling Defendants shall, subject to Paragraph 50, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the EPA's and IDEM's Project Coordinators, or, if the Project Coordinators are unavailable, EPA's and IDEM's Alternate Project Coordinators. If neither of these persons from EPA are available, the Settling Defendants shall notify the EPA Emergency Response Branch, Region 5. Settling Defendants shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the Contingency Plans, and any other applicable plans or documents developed pursuant to the SOW. In the event that Settling Defendants fail to take appropriate response action as required by this Section, and EPA or, as appropriate, the State takes such action instead, Settling Defendants shall reimburse EPA and the State all costs of the response action not inconsistent with the NCP pursuant to Section XVII (Reimbursement of Response Costs).

50. Nothing in the preceding Paragraph or in this Consent Decree shall be deemed to limit any authority of the United States, or the State, to take, direct, or order all appropriate action or to seek an order from the Court to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site.

XVII. REIMBURSEMENT OF RESPONSE COSTS

51. Within 30 days of the effective date of this Consent Decree, Settling Defendants shall:

a. Pay to the United States $ 451,456.34 in the form of a certified check or checks made payable to "EPA Hazardous Substance Superfund," and referencing CERCLA Number 6J7 and DOJ Case Number 90-11-3-1094 in reimbursement of Past Response Costs. The Settling Defendants shall forward the certified check(s) to U.S. EPA, Superfund Accounting, P.O. Box 70753, Chicago, Illinois, 60673 and shall send copies of the check to the United States as specified in Section XXVII (Notices and Submissions) and Director, Waste Management Division, U.S. EPA, Region V, 77 West Jackson, Blvd., Chicago, Illinois 60604.

b. Pay to the State $_____ (estimated not to exceed $50,000) in the form of a certified check or checks made payable to the Indiana Hazardous Substances Response Trust Fund, in reimbursement of Past Response Costs incurred by the State. The Settling Defendants shall send the certified check(s) with a transmittal letter referencing the American Chemical Services Site to the Indiana Dept. of Environmental Management, Attention:

Cashier, 105 South Meridian Street, P.O. Box 7060, Indianapolis, Indiana 46206-7060. Settling Defendants shall mail a copy of the check with a transmittal letter to IDEM, Attention: American Chemical Services, Inc. Project Manager, Superfund Section, 5500 West Bradbury Avenue, Indianapolis, Indiana 46241.

52. Settling Defendants shall reimburse the United States and the State for all Future Response Costs not inconsistent with the National Contingency Plan incurred by the United States and the State. The United States and the State will each send Settling Defendants a bill requiring payment that includes an Itemized Cost Summary on a periodic basis. Settling Defendants shall make all payments within 30 days of Settling Defendants' receipt of each bill requiring payment, except as otherwise provided in Paragraph 53. The Settling Defendants shall make all payments required by this Paragraph in the manner described in Paragraph 51.

53. Settling Defendants may contest payment of any Future Response Costs under Paragraph 52 if they determine that the United States or the State has made an accounting error or if they allege that a cost item that is included represents costs that are inconsistent with the NCP. Such objection shall be made in writing within 30 days of receipt of the bill and must be sent to the United States (if the United States' accounting is being disputed) or the State (if the State's accounting is being disputed) pursuant to Section XXVII (Notices and Submissions). Any such objection shall specifically identify the contested Future Response Costs and the basis for objection. In the event of an objection, the

Settling Defendants shall within the 30 day period pay all uncontested Future Response Costs to the United States or the State in the manner described in Paragraph 51. Simultaneously, the Settling Defendants shall establish an interest bearing escrow account in a federally-insured bank duly chartered in the State of Indiana and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. The Settling Defendants shall send to the United States, as provided in Section XXVII (Notices and Submissions), and the State a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, the Settling Defendants shall initiate the Dispute Resolution procedures in Section XX (Dispute Resolution). If the United States or the State prevails in the dispute, within 5 days of the resolution of the dispute, the Settling Defendants shall pay the sums due (with accrued interest) to the United States or the State, if State costs are disputed, in the manner described in Paragraph 51. If the Settling Defendants prevail concerning any aspect of the contested costs, the Settling Defendants shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to the United States or the State, if State costs are disputed, in the manner

described in Paragraph 51; Settling Defendants shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XX (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding the Settling Defendants' obligation to reimburse the United States and the State for its their Future Response Costs.

54. In the event that the payments required by Paragraph 51 are not made within 30 days of the effective date of this Consent Decree or the payments required by Paragraph 52 are not made within 30 days of the Settling Defendants' receipt of the bill, Settling Defendants shall pay interest on the unpaid balance at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607. The interest to be paid on Past Response Costs shall begin to accrue on the effective date of the Consent Decree. The interest on Future Response Costs shall begin to accrue on the date of the Settling Defendants' receipt of the bill. Interest shall accrue at the rate specified through the date of the Settling Defendant's payment. Payments of interest made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiffs by virtue of Settling Defendants' failure to make timely payments under this Section.

XVIII. INDEMNIFICATION AND INSURANCE

55. The United States and the State do not assume any liability by entering into this agreement or by virtue of any designation of Settling Defendants as EPA's authorized

representatives under Section 104(e) of CERCLA. Settling Defendants shall indemnify, save and hold harmless the United States, the State, and their officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Further, the Settling Defendants agree to pay the United States and the State all costs they incur including, but not limited to, attorneys fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States or the State based on acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree. Neither the United States nor the State shall not be held out as a party to any contract entered into by or on behalf of Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants nor any such contractor shall be considered an agent of the United States or the State.

56. Settling Defendants waive all claims against the United States and the State for damages or reimbursement or for set-off of any payments made or to be made to the United States or the State, arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendants shall indemnify and hold harmless the United States and the State with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

57. No later than 15 days before commencing any on-site Work, Settling Defendants shall secure, and shall maintain until the first anniversary of EPA's Certification of Completion of the Remedial Action pursuant to Paragraph 47.b. of Section XV (Certification of Completion) comprehensive general liability insurance and automobile insurance with limits of $5 million dollars, combined single limit naming as additional insured the United States and the State. In addition, for the duration of this Consent Decree, Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on

behalf of Settling Defendants in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Settling Defendants shall provide to EPA and the State certificates of such insurance and a copy of each insurance policy. Settling Defendants shall resubmit such certificates and copies of policies each year on the anniversary of the effective date of this Consent Decree. If Settling Defendants demonstrate by evidence satisfactory to EPA and the State that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendants need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

XIX. FORCE MAJEURE

58. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of the Settling Defendants or of any entity controlled by Settling Defendants, including, but not limited to, their contractors and subcontractors, that delays or prevents the performance of any obligation under this Consent Decree despite Settling Defendants' best efforts to fulfill the obligation. The requirement that the Settling Defendants exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring and (2)

following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the Work or a failure to attain the Performance Standards.

59. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the Settling Defendants shall notify orally EPA's Project Coordinator or, in his or her absence, EPA's Alternate Project Coordinator or, in the event both of EPA's designated representatives are unavailable, the Director of the Hazardous Waste Management Division, EPA Region 5, within 48 hours of when Settling Defendants first knew or should have known that the event might cause a delay. Within 5 days thereafter, Settling Defendants shall provide in writing to EPA and the State an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Settling Defendants' rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of the Settling Defendants, such event may cause or contribute to an endangerment to public health, welfare or the environment. The Settling Defendants shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Failure to comply with the above

requirements shall preclude Settling Defendants from asserting any claim of force majeure for that event. Settling Defendants shall be deemed to have notice of any circumstance of which their contractors or subcontractors had or should have had notice.

60. If EPA, after a reasonable opportunity for review and comment by the State, agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA, after a reasonable opportunity for review and comment by the State, for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA, after a reasonable opportunity for review and comment by the State, does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Settling Defendants in writing of its decision. If EPA, after a reasonable opportunity for review and comment by the State, agrees that the delay is attributable to a force majeure event, EPA will notify the Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

61. If the Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XX (Dispute Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Settling Defendants shall have the

burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Settling Defendants complied with the requirements of Paragraphs 58 and 59, above. If Settling Defendants carry this burden, the delay at issue shall be deemed not to be a violation by Settling Defendants of the affected obligation of this Consent Decree identified to EPA and the Court.

XX. DISPUTE RESOLUTION

62. a. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of the Settling Defendants that have not been disputed in accordance with this Section.

b. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to

have arisen when one party sends the other parties a written Notice of Dispute.

63. a. In the event that the parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within 10 days after the conclusion of the informal negotiation period, Settling Defendants invoke the formal dispute resolution procedures of this Section by serving on the United States and the State a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by the Settling Defendants. The Statement of Position shall specify the Settling Defendants' position as to whether formal dispute resolution should proceed under paragraph 64 or 65.

b. Within fourteen (14) days after receipt of Settling Defendants' Statement of Position, EPA will consider any comments received from the State and serve on Settling Defendants its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 65 or 66.

c. If there is disagreement between EPA and the Settling Defendants as to whether dispute resolution should proceed under Paragraph 64 or 65, the parties to the dispute shall follow the

procedures set forth in the paragraph determined by EPA to be applicable. However, if the Settling Defendants ultimately appeal to the court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 64 and 65.

64. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation: (1) the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree; and (2) the adequacy of the performance of response actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by Settling Defendants regarding the validity of the ROD's provisions.

a. An administrative record of the dispute shall be maintained by EPA and shall contain all statements of position, including supporting documentation, submitted pursuant to this Paragraph. Where appropriate, EPA may allow submission of supplemental statements of position by the parties to the dispute.

b. The Director of the Waste Management Division, EPA Region 5, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph

64.a. This decision shall be binding upon the Settling Defendants, subject only to the right to seek judicial review pursuant to Paragraph 64.c. and d.

c. Any administrative decision made by EPA pursuant to Paragraph 64.b. shall be reviewable by this Court, provided that a notice of judicial appeal is filed by the Settling Defendants with the Court and served on all Parties within 10 days of receipt of EPA's decision. The notice of judicial appeal shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to Settling Defendants' notice of judicial appeal. The State may also file a response to the Settling Defendants notice of judicial appeal.

d. In proceedings on any dispute governed by this Paragraph, Settling Defendants shall have the burden of demonstrating that the decision of the Waste Management Division Director is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Paragraphs 64.a.

65. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of Settling Defendants' Statement of Position submitted pursuant to Paragraph 63, the Director of the Waste Management Division, EPA Region 5, will issue a final decision resolving the dispute. The Waste Management Division Director's decision shall be binding on the Settling Defendants unless, within 10 days of receipt of the decision, the Settling Defendants file with the Court and serve on the parties a notice of judicial appeal setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. The United States and the State may file a response to Settling Defendants' notice of judicial appeal.

b. Notwithstanding Paragraph M of Section I (Background) of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable provisions of law.

66. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of the Settling Defendants under this Consent Decree not directly in dispute, unless EPA or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 75. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent

Decree. In the event that the Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XXI (Stipulated Penalties).

XXI. STIPULATED PENALTIES

67. Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs 68 and 69 to the United States and the State for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section XIX (Force Majeure). "Compliance" by Settling Defendants shall include completion of the activities under this Consent Decree or any work plan or other plan approved under this Consent Decree identified below in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans or other documents approved by EPA pursuant to this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

68. a. The following stipulated penalties shall be payable per violation per day __% to the United States and __% to the State for failure to submit timely or adequate reports or other written documents identified in Subparagraph b:

Penalty Per Violation Per Day	Period of Noncompliance
$5000	Days 1-7
$10000	Days 8-30
$15000	Over 30 days

b. Failure to submit the following plans or reports:

1. Pre-Design Work Plan
2. Final RD Work Plan

3. Preliminary Design (30%)
4. Intermediate Design (60%)
5. Final Design (100%)
6. Draft RA Work Plan
7. Final RA Work Plan

c. The following stipulated penalties shall be payable per violation per day to the United States for failure to submit progress reports:

Penalty Per Violation Per Day	Period of Noncompliance
$1500	Days 1-7
$3000	Days 8-30
$6000	Over 30 days

69. a. The following stipulated penalties shall be payable per violation per day __% to the United States and __% to the State for any noncompliance identified in Subparagraph b:

Penalty Per Violation Per Day	Period of Noncompliance
$ 8000	Days 1-7
$15000	Days 8-30
$20000	Over 30 days

b) Violations or compliance milestones

PreDesign Studies
Installation of soil treatment technologies
Implementation of soil treatment technologies
Installation of ground water extraction and treatment
Implementation of ground water extraction an treatment
Fence Installation
Deed Restrictions
Exceedance of surface water discharge limits
Exceedance of air discharge limits
Failure to comply with notice or other requirements of the Consent Decree
Failure to take action to abate an endangerment pursuant to Section XVI of the Consent Decree

70. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 83 of Section XXII (Covenants Not to Sue by Plaintiffs), Settling Defendants shall be liable for a stipulated penalty in the amount of $5,000,000.

71. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

72. Following EPA's determination that Settling Defendants have failed to comply with a requirement of this Consent Decree, EPA may give Settling Defendants written notification of the same and describe the noncompliance. EPA and the State may send the Settling Defendants a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified the Settling Defendants of a violation.

73. All penalties owed to the United States and the State under this section shall be due and payable within 30 days of the Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Settling Defendants invoke the Dispute Resolution procedures under Section XX (Dispute Resolution). All payments under this Section shall be paid by certified check made payable to "EPA Hazardous Substances Superfund," shall be mailed to U.S. EPA, Superfund Accounting, P.O. Box 70753, Chicago, Illinois,

60673, and shall reference CERCLA Number 6J7 and DOJ Case Number 90-11-3-1094. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to the United States as provided in Section XXVII (Notices and Submissions). All monies payable to the State under this Section shall be made in the manner provided for in Paragraph 51.b. of Section XVII (Reimbursement of Response Costs).

74. The payment of penalties shall not alter in any way Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

75. Penalties shall continue to accrue as provided in Paragraph 71 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owing shall be paid to EPA and the State within 15 days of the agreement or the receipt of EPA's decision or order;

b. If the dispute is appealed to this Court and the United States prevails in whole or in part, Settling Defendants shall pay all accrued penalties determined by the Court to be owed to EPA and the State within 60 days of receipt of the Court's decision or order, except as provided in Subparagraph c below;

c. If the District Court's decision is appealed by any Party, Settling Defendants shall pay all accrued penalties determined by the District Court to be owing to the United States

or the State into an interest-bearing escrow account within 60 days of receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every 60 days. Within 15 days of receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to EPA and the State or to Settling Defendants to the extent that they prevail.

76. a. If Settling Defendants fail to pay stipulated penalties when due, the United States or the State may institute proceedings to collect the penalties, as well as interest. Settling Defendants shall pay interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 73 at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607.

b. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States or the State to seek any other remedies or sanctions available by virtue of Settling Defendants' violation of this Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(l) of CERCLA.

77. No payments made under this Section shall be tax deductible for Federal or State tax purposes.

XXII. COVENANTS NOT TO SUE BY PLAINTIFFS

78. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants under

the terms of the Consent Decree, and except as specifically provided in Paragraphs 79, 80, and 82 of this Section, the United States covenants not to sue or to take administrative action against Settling Defendants pursuant to Sections 106 and 107(a) of CERCLA for performance of the Work and for recovery of Past Response Costs and Future Response Costs. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants under the terms of the Consent Decree, and except as specifically provided in Paragraphs 79, 80, and 82 of this Section, the State covenants not to sue or to take administrative action against Settling Defendants pursuant to Section 107(a) of CERCLA and IC 13-7-8.7 and 13-7-12 for performance of the Work and for recovery of Past Response Costs and Future Response Costs. These covenants not to sue shall take effect upon the receipt by EPA of the payments required by Paragraph 51 of Section XVII (Reimbursement of Response Costs). These covenants not to sue are conditioned upon the complete and satisfactory performance by Settling Defendants of their obligations under this Consent Decree. These covenants not to sue extend only to the Settling Defendants and do not extend to any other person.

79. Pre-certification reservations.

a. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order

seeking to compel Settling Defendants (1) to perform further response actions relating to the Site or (2) to reimburse the United States for additional costs of response if, prior to certification of completion of the Remedial Action:

(i) conditions at the Site, previously unknown to EPA, are discovered, or

(ii) information, previously unknown to EPA, is received, in whole or in part,

and these previously unknown conditions or information together with any other relevant information indicates that the Remedial Action is not protective of human health or the environment.

b. Notwithstanding any other provision of this Consent Decree, the State reserves, and this Consent Decree is without prejudice to, any right it may have, jointly with, or separately from the United States, to institute proceedings in this action or in a new action pursuant to the State's authorities under § 107 of CERCLA or applicable State law, including IC 13-7-8.7 and 13-7-12, seeking to compel Settling Defendants: (1) to perform further response actions relating to the Site or (2) to reimburse the State for additional costs of response if, prior to certification of completion of the Remedial Action:

(i) conditions at the Site, previously unknown to the State, are discovered, or

(ii) information, previously unknown to the State, is received, in whole or in part,

and the State determines, based on these previously unknown conditions or information together with any other relevant information indicates that the response action is not protective of human health or the environment.

80. Post-certification reservations.

a. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants (1) to perform further response actions relating to the Site or (2) to reimburse the United States for additional costs of response if, subsequent to certification of completion of the Remedial Action:

(i) conditions at the Site, previously unknown to the EPA, are discovered, or

(ii) information, previously unknown to EPA, is received, in whole or in part, after the certification of completion,

and these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action is not protective of human health or the environment.

b. Notwithstanding any other provision of this Consent Decree, the State reserves, and this Consent Decree is without prejudice to, any right it may have, jointly with, or separately from the United States, to institute proceedings in this action or in a new action, pursuant to the State's authorities under § 107 of

CERCLA or applicable State law, including IC 13-7-8.7 and 13-7-12, seeking to compel Settling Defendants (1) to perform further response actions relating to the Site or (2) to reimburse the State for additional costs of response if, subsequent to certification of completion of the Remedial Action:

(i) conditions at the Site, previously unknown to the State, are discovered, or

(ii) information is received, in whole or in part, after the certification of completion,

and the State determines, based on these previously unknown conditions or this information together with other relevant information indicate that the response action is not protective of human health or the environment.

81. For purposes of Paragraph 79, the information and the conditions known to EPA and the State shall include only that information and those conditions set forth in the Record of Decision for the Site and the administrative record supporting the Record of Decision. For purposes of Paragraph 80, the information and the conditions known to EPA and the State shall include only that information and those conditions set forth in the Record of Decision, the administrative record supporting the Record of Decision, and any information received by EPA pursuant to the requirements of this Consent Decree prior to Certification of Completion of the Remedial Action.

82. General reservations of rights. The covenants not to sue set forth above do not pertain to any matters other than those

expressly specified in Paragraph 78. The United States and the State reserve, and this Consent Decree is without prejudice to, all rights against Settling Defendants with respect to all other matters, including but not limited to, the following:

(1) claims based on a failure by Settling Defendants to meet a requirement of this Consent Decree;

(2) liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site:

(3) liability for damages for injury to, destruction of, or loss of natural resources;

(4) liability for response costs that have been or may be incurred by the Federal and State natural resources trustees at the Site;

(5) criminal liability;

(6) liability for violations of federal or state law which occur during or after implementation of the Remedial Action; and

(7) previously incurred costs of response above the amounts reimbursed pursuant to Paragraph 51.

83. In the event EPA determines that Settling Defendants have failed to implement any provisions of the Work in an adequate or timely manner, EPA may perform any and all portions of the Work as EPA determines necessary. Settling Defendants may invoke the procedures set forth in Section XX (Dispute Resolution) to dispute EPA's determination that the Settling Defendants failed to

implement a provision of the Work in an adequate or timely manner as arbitrary and capricious or otherwise not in accordance with law. Such dispute shall be resolved on the administrative record. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered Future Response Costs that Settling Defendants shall pay pursuant to Section XVII (Reimbursement of Response Costs).

84. Notwithstanding any other provision of this Consent Decree, the United States and the State retains all authority and reserve all rights to take any and all response actions authorized by law.

XXIII. COVENANTS BY SETTLING DEFENDANTS

85. Settling Defendants hereby covenant not to sue and agree not to assert any claims or causes of action against the United States or the State with respect to the Site or this Consent Decree, including, but not limited to, any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 111, 112, 113 or any other provision of law, any claim against the United States or the State, including any department, agency or instrumentality of the United States or the State under CERCLA Sections 107 or 113 and IC 13-7-8.7 related to the Site, or any claims arising out of response activities at the Site. However, the Settling Defendants reserve, and this Consent Decree is without prejudice to, actions against the United States based on negligent actions taken directly by the

United States (not including oversight or approval of the Settling Defendants plans or activities) that are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA. Nothing in this Consent Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXIV. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

86. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a party hereto.

87. With regard to claims for contribution against Settling Defendants for matters addressed in this Consent Decree, the Parties hereto agree that the Settling Defendants are entitled to such protection from contribution actions or claims as is provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2) or IC 13-7-8.7.

88. The Settling Defendants agree that with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree they will notify the United States and the

State in writing no later than 60 days prior to the initiation of such suit or claim.

89. The Settling Defendants also agree that with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree they will notify in writing the United States and the State within 10 days of service of the complaint on them. In addition, Settling Defendants shall notify the United States and the State within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

90. In any subsequent administrative or judicial proceeding initiated by the United States or the State for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendants shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States or the State in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XXII (Covenants Not to Sue by Plaintiffs).

XXV. ACCESS TO INFORMATION

91. Settling Defendants shall provide to EPA and the State, upon request, copies of all documents and information within their possession or control or that of their contractors or agents

relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Settling Defendants shall also make available to EPA and the State, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

92. a. Settling Defendants may assert business confidentiality claims covering part or all of the documents or information submitted to Plaintiffs under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b) or by IC 13-7-16-3 and 329 IAC 3.1-3-4. Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA and the State, or if EPA has notified Settling Defendants that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA, the public may be given access to such documents or information without further notice to Settling Defendants.

b. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law.

If the Settling Defendants assert such a privilege in lieu of providing documents, they shall provide the Plaintiffs with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information: and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

93. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

XXVI. RETENTION OF RECORDS

94. Until 10 years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 48.b of Section XV (Certification of Completion of the Work), each Settling Defendant shall preserve and retain all records and documents now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary. Until 10 years after the Settling Defendants'

receipt of EPA's notification pursuant to Paragraph 48.b of Section XV (Certification of Completion), Settling Defendants shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work.

95. At the conclusion of this document retention period, Settling Defendants shall notify the United States and the State at least 90 days prior to the destruction of any such records or documents, and, upon request by the United States or the State, Settling Defendants shall deliver any such records or documents to EPA or the State. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege, they shall provide the Plaintiffs with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information: and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

96. Each Settling Defendant hereby certifies, individually, that it has not altered, mutilated, discarded, destroyed or

otherwise disposed of any records, documents or other information relating to its potential liability regarding the Site since notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Section 104(e) and 122(e) of CERCLA and Section 3007 of RCRA.

XXVII. NOTICES AND SUBMISSIONS

97. Whenever, under this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA, the State, and the Settling Defendants, respectively.

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ # 90-11-3-1094

and

Director, Waste Management Division
United States Environmental Protection Agency
Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

As to EPA:

Wayde Hartwick
EPA Project Coordinator
United States Environmental Protection Agency
Region V (HSRL-6J)
77 W. Jackson Blvd.
Chicago, IL 60604

As to the State:

Gabriele Hauer
State Project Coordinator
Indiana Department of
Environmental Management
5500 West Bradbury Avenue
Indianapolis, Indiana 46241

As to the Settling Defendants:

[Name]
Settling Defendants' Project Coordinator
[Address]

XXVIII. EFFECTIVE DATE

98. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

XXIX. RETENTION OF JURISDICTION

99. This Court retains jurisdiction over both the subject matter of this Consent Decree and the Settling Defendants for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction

or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XX (Dispute Resolution) hereof.

XXX. APPENDICES

100. The following appendices are attached to and incorporated into this Consent Decree:

"Appendix A" is the ROD.

"Appendix B" is the SOW.

"Appendix C" is the description and/or map of the Site.

"Appendix D" is the complete list of the Settling Defendants.

"Appendix E" is the complete list of the Owner Settling Defendants.

XXXI. COMMUNITY RELATIONS

101. Settling Defendants shall propose to EPA and the State their participation in the community relations plan to be developed by EPA. EPA will determine the appropriate role for the Settling Defendants under the Plan. Settling Defendants shall also cooperate with EPA and the State in providing information regarding the Work to the public. As requested by EPA or the State, Settling Defendants shall participate in the preparation of such information for dissemination to the public and in public meetings which may be held or sponsored by EPA or the State to explain activities at or relating to the Site.

XXXII. MODIFICATION

102. Schedules specified in this Consent Decree for completion of the Work may be modified by agreement of EPA, after reasonable opportunity for review and comment by the State, and the Settling Defendants. All such modifications shall be made in writing.

103. No material modifications shall be made to the SOW without written notification to and written approval of the United States, Settling Defendants, and the Court. Prior to providing its approval to any modification, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification. Modifications to the SOW that do not materially alter that document may be made by written agreement between EPA, after providing the State with a reasonable opportunity to review and comment on the proposed modification, and the Settling Defendants.

104. Nothing in this Decree shall be deemed to alter the Court's power to enforce, supervise or approve modifications to this Consent Decree.

XXXIII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

105. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with Section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the Consent Decree disclose facts or considerations which indicate

that the Consent Decree is inappropriate, improper, or inadequate. Settling Defendants consent to the entry of this Consent Decree without further notice.

106. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

XXXIV. SIGNATORIES/SERVICE

107. Each undersigned representative of a Settling Defendant to this Consent Decree and the Assistant Attorney General for Environment and Natural Resources of the Department of Justice certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such party to this document.

108. Each Settling Defendant hereby agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States has notified the Settling Defendants in writing that it no longer supports entry of the Consent Decree.

109. Each Settling Defendant shall identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants hereby agree to accept service in that manner and to waive the formal service requirements

set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons.

SO ORDERED THIS _____ DAY OF _____, 19__.

_____
United States District Judge

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. _____, relating to the _____ Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: _____

_____
[Name]
Acting Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

_____
[Name]
Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

_____
[Name]
Assistant United States Attorney
Northern District of Indiana
U.S. Department of Justice
[Address]

[Name]
Assistant Administrator for
Enforcement
U.S. Environmental Protection
Agency
401 M Street, S.W.
Washington, D.C. 20460

[Name]
Office of Enforcement
U.S. Environmental Protection
Agency
401 M Street, S.W.
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Valdas V. Adamkus
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Steven Siegel
Assistant Regional Counsel
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Assistant Regional Counsel
U.S. Environmental Protection
Agency
Region 5
77 W.Jackson Blvd.
Chicago, IL 60604

United States et al v. American Chemical Services, Inc. et al
Consent Decree Signature Page

FOR THE STATE OF INDIANA

Date: _____ By: _____
Office of the Governor

Date: _____

By: _____
Kathy Prosser, Commissioner
Indiana Department of
Environmental Management

Date: _____

Approved as to Form and Legality

Attorney General, State of Indiana
Pamela Carter

By: _____
Deputy Attorney General

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States v. _____, relating to the _____ Superfund Site.

FOR _____ COMPANY, INC. */

Date: _____ _____

[Name -- Please Type]
[Title -- Please Type]
[Address -- Please Type]

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: [Please Type]
Title: _____
Address: _____
Tel. Number: _____

---

*/ A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the United States.

APPENDIX A

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

American Chemical Services
Griffith, Indiana

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected remedial action for the American Chemical Services (ACS) site located in Griffith, Indiana. This action was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, with the National Oil and Hazardous Substances Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The State of Indiana concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The major components of the selected remedy include:

- Ground water pumping and treatment system to dewater the site and to contain the contaminant plume with subsequent discharge of the treated ground water to surface water and wetlands;

- Excavation of approximately 400 drums in the On-site Containment Area for offsite incineration;

- Excavation of buried waste materials and treatment by low-temperature thermal treatment (LTTT);

- On-site treatment or off-site disposal of treatment condensate;

- Vapor emission control during excavation and possible immobilization of inorganic contaminants after LTTT;

- Off-site disposal of miscellaneous debris;

- In-situ vapor extraction pilot study of buried waste in On-site Area;

- In-situ vapor extraction of contaminated soils;
- Continued evaluation and monitoring of wetlands and, if necessary, remediation;
- Long term ground water monitoring;
- Fencing the site and possible implementation of deed and access restrictions and deed notices; and
- Private well sampling with possible well closures or ground water use advisories.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies which employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy may result in hazardous substances remaining on-site above health-based levels, a review will be conducted at least every five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

September 30, 1992
Date

Valdas V. Adamkus
Regional Administrator, Region V

DECISION SUMMARY
AMERICAN CHEMICAL SERVICES

I. SITE LOCATION AND DESCRIPTION

The American Chemical Services Superfund site (ACS), located at 420 S. Colfax Ave., Griffith, Indiana, (Fig. 1) includes ACS property (19 acres), Pazmey Corp. property (formerly Kapica Drum, Inc, now owned by Darija Djurovic.; two acres) and the inactive portion of the Griffith Municipal Landfill (approximately 15 acres) (Fig. 2). The ACS Superfund Site includes all these properties. ACS began as a solvent recovery facility in May 1955. ACS ceased solvent reclaiming activities in 1990 after losing interim status under RCRA. ACS currently operates as a chemical manufacturer.

Land around the site is used for single family residences and industrial purposes. The site is bordered on the east and northeast by Colfax Avenue. The Chesapeake and Ohio railway bisects the site in a northwest-southeast direction, between the fenced On-site Area and the Off-site Area. On the west and northwest, south of the Chesapeake and Ohio railway, the site is bordered by the abandoned Erie and Lackawanna railway and the active portion of the Griffith Municipal Landfill. North of the Chesapeake and Ohio railway, the site is bordered on the west by wetland areas. The northern boundary of the site is formed by the Grand Trunk railway.

The site is underlain by unconsolidated glacial deposits approximately 130 feet thick. The deposits have been divided into an upper sand and gravel aquifer, an intermediate clay, a lower sand and gravel aquifer, and a lower clay till directly overlying Devonian Detroit River and Traverse System Limestones. Using U.S. EPA guidelines for ground water classification, both the upper and lower aquifers are currently used or potentially available for drinking water or other beneficial uses and are therefore considered Class II for the purposes of this remedial action. Surface water runoff is generally to the west and south. Surface water runoff appears to be confined to the site by drainage to the wetlands and subsequent infiltration. There appears to be no direct connection between site surface water drainage and local streams, however, ground water does discharge to the wetlands and the wetlands are ultimately drained by Turkey Creek, approximately 1 1/2 miles south of the site.

The nearest residents to the site are located approximately 150 feet east of the Off-site Area. The nearest potential receptors to potentially contaminated ground water through ingestion and to volatile compound emissions through inhalation are employees of the businesses located approximately 100 feet east, on Colfax Avenue. To the south and west of the site, the nearest potential receptors are the employees of the Griffith Municipal landfill,

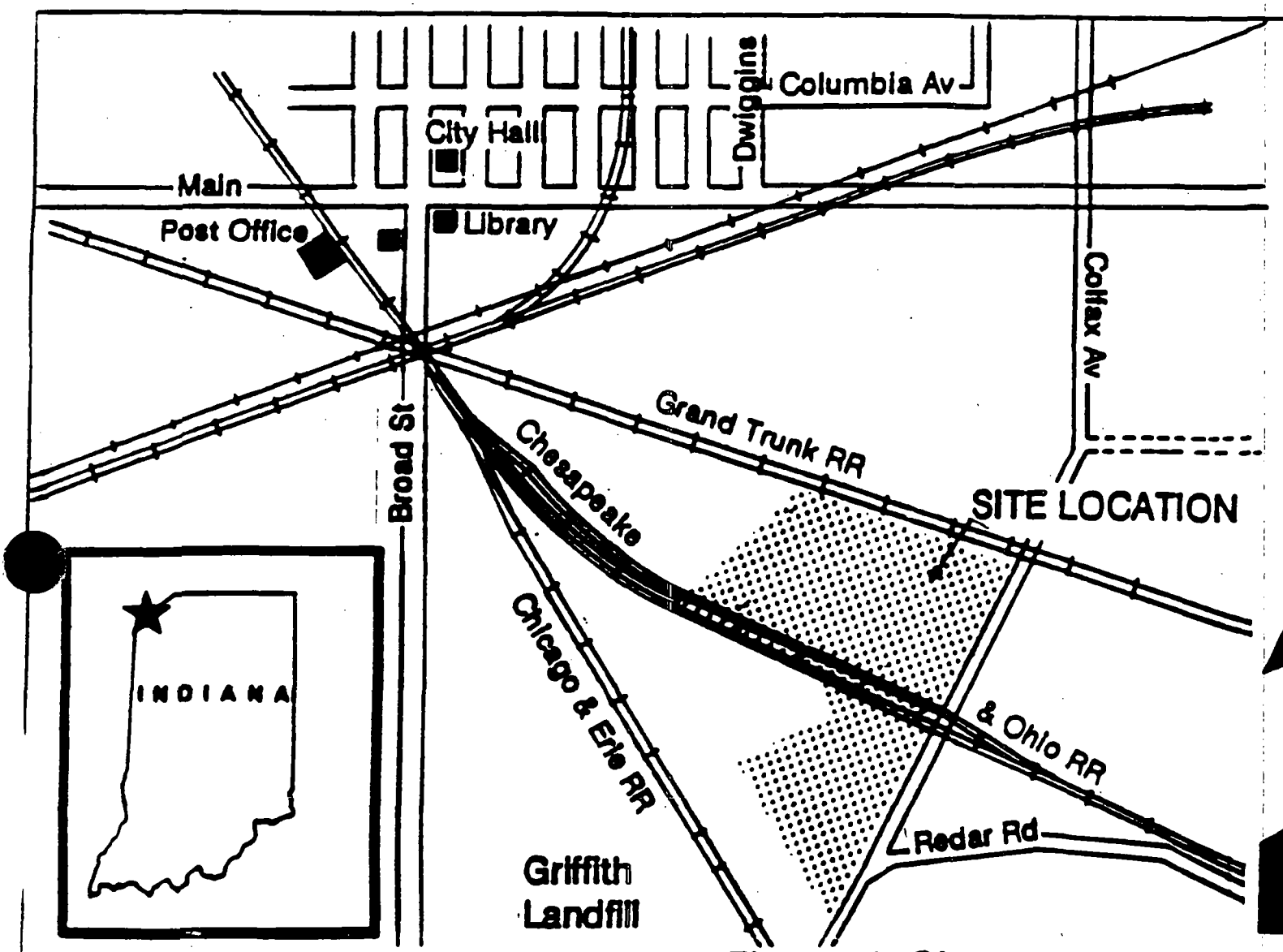


Figure 1, Site Location Map

and occupants of the residential development approximately 800 feet west of the site boundary. The nearest potential receptors to the north are occupants of the industrial park on Main Street (approximately 1500 feet north of the site boundary).

Ground water contamination has migrated off-site but has not infiltrated local residential wells used for drinking water. Approximately 70 private wells were identified in the immediate vicinity. 9 upper aquifer wells and 16 lower aquifer wells are located within 1/2 mile of the site. The well survey conducted during the remedial investigation found upper aquifer waters to be nonpotable and used by residents for lawn maintenance or other domestic purposes other than consumption. The upper aquifer residential wells were not sampled as part of the remedial investigation. Investigative monitoring wells were installed to evaluate upper aquifer contamination. Most of the 16 lower aquifer wells are used for drinking water. Samples were obtained from 10 lower aquifer private wells during the remedial investigation. With the exception of elevated lead levels found in an unused industrial supply well, no contaminants of concern were found in any lower aquifer water supply well.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

In the late 1960s and early 1970s, small batches of chemicals were manufactured at ACS. Specific chemicals manufactured included barium naphtherate, brominated vegetable oil, lacquers and paints, liquid soldering fluid, and polyethylene solutions in polybutene. These early manufacturing operations also included bromination, treating rope with a fungicide, and treating ski cable.

Two on-site incinerators burned still bottoms, non-reclaimable materials generated from the site, and off-site wastes. The first incinerator started operating in 1966, the second in 1969, and burned about two million gallons of industrial waste per year. The incinerators were dismantled in the 1970's. The shells were cut up and scrapped; the burners and blowers remain on-site.

Batch manufacturing was expanded between 1970 and 1975. Additives, lubricants, detergents and soldering flux were manufactured, and an epoxidation plant created a product called a plasticizer. Since 1975, the small batch manufacturing and epoxidation plant operations have remained essentially the same.

Kapica Drum, Inc., was sold to Pazmey Corp. in February 1980, which sold it to Darija Djurovic in March 1987. Kapica/Pazmey has not operated at this location since 1987. In 1980, a 31-acre parcel of property to the west of the Off-site Containment Area was sold to the City of Griffith for an expansion of the City's

municipal landfill. The Griffith Municipal Landfill has been an active sanitary solid waste disposal facility since the 1950s. Solvent recovery operations at ACS continued until 1990 when ACS lost interim status under the Resource Conservation and Recovery Act (RCRA) regulations due to the failure of ACS to obtain required insurance policies. Semi-volatile organic compounds (SVOCs) such as phenol, isophorone, napthalene, fluorene, phenanthrene, anthracene, bis (2-chloroethyl) ether, and phthalates were used and discarded at the site throughout its history.

Several areas on the ACS property were used for disposal of hazardous substances. The disposal areas on the ACS Site, depicted in Figure 2, have been consolidated into three identified source areas: 1) the On-Site Containment Area; 2) the Still Bottoms Area, Treatment Lagoon #1 and adjacent areas; and 3) the Off-Site Containment Area and Kapica/Pazmey property. The Off-Site Containment Area is located on the ACS property and is part of the ACS Site. The area is described as off-site since it is separated from the ACS plant by a fence and railroad tracks. The Off-site Area includes the Off-site Containment Area and the Kapica/Pazmey property. The On-site Area includes the On-site Containment Area, the Still Bottoms Area, Treatment Lagoon #1, and adjacent areas (oily soil area designated in Fig. 2).

ACS was placed on the National Priorities List (NPL), a roster of the nation's worst hazardous waste sites targeted for cleanup under Superfund authority, in September 1984. Approximately 400 drums containing sludge and semi-solids of unknown types were reportedly disposed of in the On-site Containment Area. The Off-site Containment Area was utilized principally as a waste disposal area and received wastes that included on-site incinerator ash, general refuse, a tank truck containing solidified paint, and an estimated 20,000 to 30,000 drums that were reportedly punctured prior to disposal. Disposal practices in the Off-site Containment Area reportedly ceased in 1975. Hazardous substances were also disposed directly, and as a result of drum washing operations, on the Kapica/Pazmey property. The Still Bottoms Pond and Treatment Lagoon #1 received still bottoms from the solvent recovery process. The pond and lagoon were taken out of service in 1972, drained, and filled with an estimated 3200 drums containing sludge materials.

Approximately 400 special notice letters were sent out in March 1987 to initiate Remedial Investigation/Feasibility Study negotiations. A Consent Order to perform an RI/FS was signed by the PRP's in June 1988. Under this Consent Order, Warzyn, Inc., a consultant for the PRPs, performed the RI/FS. The RI began in 1989 and the RI/FS was completed in 1992. A portion of the RI, the ecological assessment, was prepared by USEPA due to the PRPs inadequate submittals. Additionally, the PRPs refused to

develop clean-up standards so proposed human-health risk based cleanup standards were developed by USEPA to supplement the FS.

USEPA recently issued combination general notice/information request letters to a number of previously unnoticed PRPs. Special notice letters will be issued and negotiations will begin after completion of this Record of Decision.

III. COMMUNITY RELATIONS ACTIVITIES

USEPA has conducted community relations activities at the site since the start of the remedial investigation in 1989. The proposed plan was released to the public (by public notice in a local newspaper) on June 30, 1992, informing residents that the Feasibility Study Report, along with other documents comprising the Administrative Record for the site, were available at the public information repositories at the Griffith Town Hall and the Griffith Public Library. The Administrative Record Index is included as Appendix A. A public comment period was established for June 30, 1992, to July 29, 1992. After public request, the public comment period was extended until August 28, 1992. A public meeting was held at the Griffith Town Hall on July 9, 1992, to discuss the proposed remedial action with residents. Public comments and the USEPA responses are included as Appendix B.

IV. SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses buried drums, buried wastes, contaminated soil and debris, contaminated ground water and contaminated surface water. This contamination represents the principal threat from the ACS site. Buried wastes and contaminated soil and debris present a threat as a continuous contaminant source to ground water, a direct contact threat should future excavation occur, and a inhalation threat from migration of volatile contaminants through existing cover material and possible dispersion of contaminants to the neighboring community. Contaminated ground water presents a threat to potential users through ingestion, dermal contact, and inhalation.

It is the purpose of this remedy to restore contaminated property to an acceptable level that will allow unrestricted use of the property (within the context of local zoning laws). Cleanup levels included in the ROD would allow future residential use of the property. Ground water use restrictions may be necessary beyond site boundaries until the contaminant plume is verified to be contained at site boundaries. Future use of ground water directly under the site may also be restricted. The LTTT system and ISVE technology will have to undergo treatability testing to determine if they will be able to attain final cleanup levels.

This ROD requires vapor emission controls, if necessary, and ambient air monitoring with the selected treatment technology as well as possible vapor emission control associated with the excavation of VOC contaminated material.

Further evaluation of the onsite wetlands is also necessary. Additional sediment and surface water sampling will be accomplished during pre-design. Because no sampling of nearby upper aquifer private wells was accomplished during the RI, a plan will be developed to sample these wells to assess the need for well closures or use advisories.

V. SITE CHARACTERIZATION

The Remedial Investigation has shown that there are large areas of buried contamination with a wide range of contaminants. Because of the numerous contaminants detected, compounds were grouped together to more easily evaluate contaminant distribution. Total VOCs, PCBs, and lead were chosen as indicators of the extent of wastes and contaminated soils.

The major categories of wastes include: organic contaminants without polychlorinated biphenyls (PCBs) (approximately 90% of total buried contamination), organic contaminants with PCBs (approximately 7%), and various heavy metals (approximately 3%). These were found in the three identified source areas. The source areas are; the on-site containment area, the still bottoms/treatment lagoon and adjacent areas, and the off-site containment and Kapica/Pazmey area. Buried waste volumes for source areas were based on information collected during the RI.

The RI selected 1 ppm total VOCs, 1 ppm PCBs, and 500 ppm lead to represent the extent of buried wastes/contaminated soils at the site. For the purpose of developing FS alternative cost estimates, buried wastes were defined as areas of contamination with total VOCs in excess of 10,000 ppm (Fig. 3). PCB-contaminated soils in excess of 50 ppm were also delineated. Contaminated soils were defined as areas of contamination with total VOCs in excess of 10 ppm (Fig. 4). Soils contaminated with heavy metals (lead greater than 500 ppm was used as an indicator parameter) were also found associated with buried waste areas. Other isolated pockets of metallic contamination (lead greater than 500 ppm) were also identified in the RI.

SOURCE AREAS

On-site Area

The On-site Containment Area contaminants consist predominately of organic contaminants without PCBs (15,000 cubic yards).

FIGURE 3

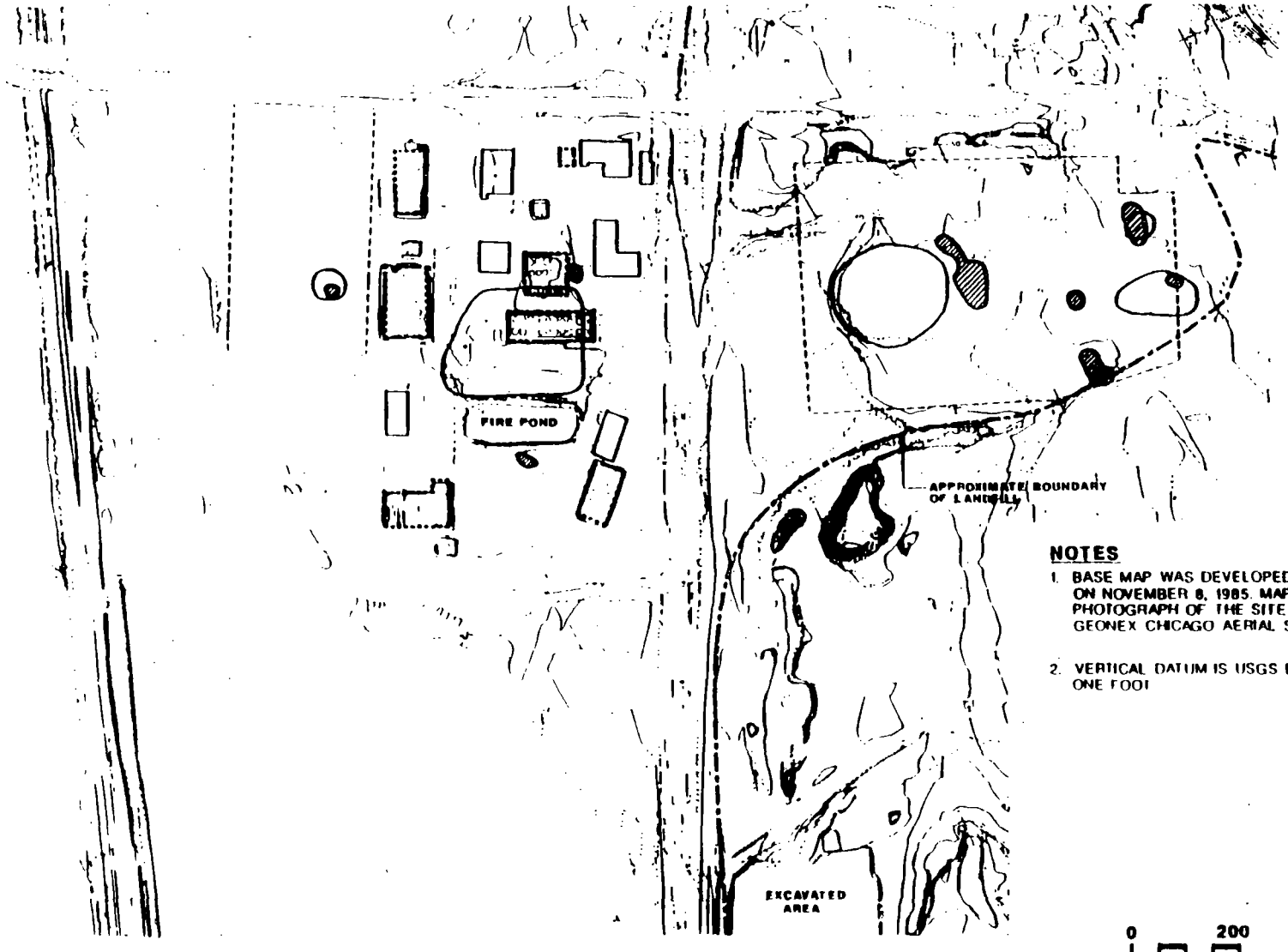
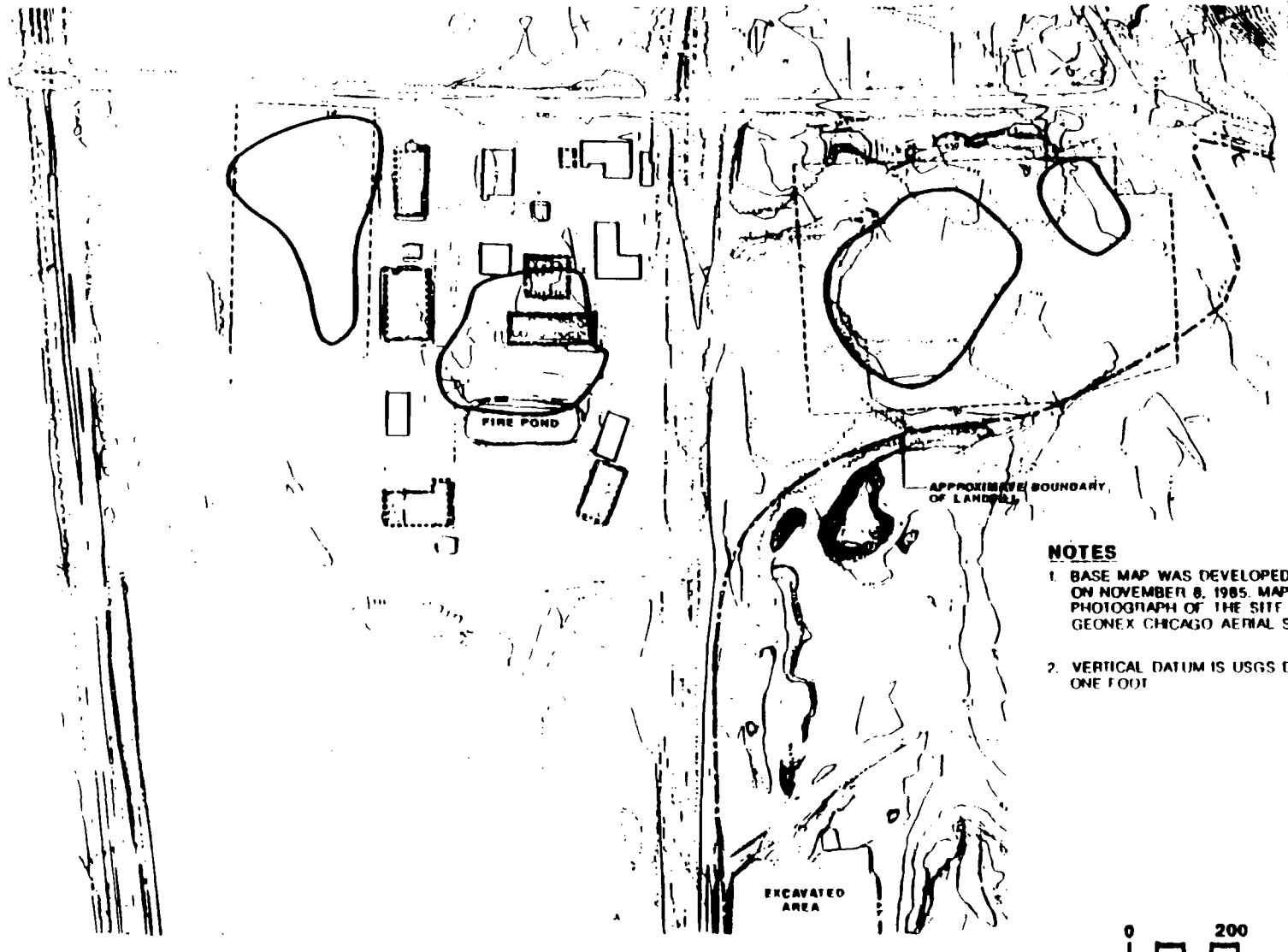

LEGEND
APPROXIMATE TANK FARM BOUNDARY
BURIED WASTE
PCBs > 50 ppm
FIRE POND
APPROXIMATE BOUNDARY OF LANDFILL
EXCAVATED AREA
NOTES
1. BASE MAP WAS DEVELOPED FOR CAMP DRESSER & MCKEE INC. ON NOVEMBER 8, 1985. MAP HAS BEEN UPDATED FROM AN AERIAL PHOTOGRAPH OF THE SITE FLOWN ON NOVEMBER 3, 1989 BY GEONEX CHICAGO AERIAL SURVEY, INC.
2. VERTICAL DATUM IS USGS DATUM. CONTOUR INTERVAL IS (1) ONE FOOT
0
200
400
SCALE IN FEET
north

FIGURE 4



LEGEND

APPROXIMATE TANK FARM BOUNDARY

CONTAMINATED SOIL (TOTAL VOCs > 10 ppm)

NOTES

1. BASE MAP WAS DEVELOPED FOR CAMP DRESSER & MCKEE INC. ON NOVEMBER 8, 1985. MAP HAS BEEN UPDATED FROM AN AERIAL PHOTOGRAPH OF THE SITE FLOWN ON NOVEMBER 3, 1989 BY GEONEX CHICAGO AERIAL SURVEY, INC.

2. VERTICAL DATUM IS USGS DATUM. CONTOUR INTERVAL IS 10 ONE FOOT

0 200 400

SCALE IN FEET

north

Additional contaminants consist of a 50'x 50' buried drum area (estimated to contain 400 intact drums), and localized areas of organic contaminants with PCBs (980 cubic yards) and soils contaminated with metals (100 cubic yards). Contamination in the On-site Containment Area is summarized below:

	DETECTED RANGE (ug/kg)
BETX	11 - 3,002,000
Chlorinated Benzenes	2 - 10,790
Chlorinated Ethenes	2 - 1,110,000
Chlorinated Ethanes	1 - 11,000
Ketones	4 - 7,400
Phthalates	39 - 15,086
PAHs	50 - 121,338
Phenols	93 - 2,270
PCBs	130 - 26,000
Lead	2900 - 1,440,000

The Still Bottoms/Treatment Lagoon and adjacent area contaminants consist predominantly of organic contaminants without PCBs (22,000 cubic yards) and randomly distributed buried drums (estimated to contain 3200 partially filled drums). Organic contaminants with PCBs were not detected in the treatment lagoon area, but were detected in the still bottoms area (1000 cubic yards). Metals were detected in both the still bottoms and treatment lagoon areas (550 cubic yards). In an adjacent area, west of the existing fire pond, (designated as "oily soils" in Fig. 2) both organic contaminants without PCBs (3400 cubic yards) and organic contaminants with PCBs (300 cubic yards) were detected. Contamination in the still bottoms/treatment lagoon and adjacent areas is summarized below.

	DETECTED RANGE (ug/kg)
BETX	66 - 34,670,000
Chlorinated Benzenes	45 - 62,500
Chlorinated Ethenes	31 - 2,000,000
Chlorinated Ethanes	8 - 21,000,000
Ketones	55 - 4,100,000
Phthalates	456 - 4,694,000
PAHs	351 - 1,057,900
Phenols	429 - 19,400
PCBs	330 - 158,000
Lead	21900 - 6,300,000

Off-site Area

The Off-site Containment Area contaminants consist predominantly of organic contaminants without PCBs (51,000 cubic yards).

However, organic contaminants with PCBs (5250 cubic yards) and metals (950 cubic yards) were detected primarily in one area in the northern portion, as well as at a number of small areas in the southern portion. General refuse, an estimated 20,000 to 30,000 drums, and a tank truck partially full of solidified paint were reportedly disposed of in this area. Contamination in the Off-site Containment Area is summarized below.

	DETECTED RANGE (ug/kg)
BETX	17 - 254,000,000
Chlorinated Benzenes	3 - 1,000,000
Chlorinated Ethenes	44 - 65,000,000
Chlorinated Ethanes	8 - 151,000,000
Ketones	52 - 197,000,000
Phthalates	54 - 19,136,000
PAHs	273 - 3,487,700
Phenols	180 - 1,054,000
PCBs	96 - 1,400,000
Lead	2300 - 17,200,000

The Kapica/Pazmey area contaminants consist of organic contaminants without PCBs (7200 cubic yards) and organic contaminants with PCBs (2300 cubic yards) in an area north of the Kapica building. Metal contamination is found in the west (700 cubic yards) and north (200 cubic yards) of the Kapica building. Contamination in the Kapica/Pazmey area is summarized below.

	DETECTED RANGE (ug/kg)
BETX	1 - 46,300,000
Chlorinated Benzenes	18 - 27,000
Chlorinated Ethenes	2 - 960,000
Chlorinated Ethanes	5 - 1,350
Ketones	2 - 367,000
Phthalates	177 - 698,100
PAHs	54 - 157,300
Phenols	280 - 34,300
PCBs	4200 - 329,000
Lead	5000 - 16,200,000

A detailed breakdown of all contaminants detected (including tentatively identified compounds) and the frequency of detection of each individual contaminant in buried waste/soil can be found in Tables 7-4 through 7-10 of the Baseline Risk Assessment (BlRA).

Ground water

Organic contaminants without PCBs, including chlorinated ethanes, partially water soluble products from gasoline, oil and/or other hydrocarbon products (e.g. benzene, toluene, xylene) were found in the upper aquifer (Table 1). Lower aquifer contamination relative to the upper aquifer is limited, both with respect to the nature of compounds detected and the extent (Table 2). Contaminants were not found to extend off-site to lower aquifer wells. No organic contaminants were detected at any lower aquifer private residential well. Upper aquifer private residential wells were not sampled during the RI.

VI. SUMMARY OF SITE RISKS

A BlRA was developed for the American Chemical Services site by respondents to the Administrative Order on Consent in accordance with USEPA's 1989 Risk Assessment Guidance for Superfund (RAGS). The purpose of a BlRA is to analyze the potential adverse health effects, both current and future, posed by hazardous substance releases from a site if no action were taken to mitigate such a release. The BlRA consists of an identification of chemicals of potential concern, toxicity assessment, exposure assessment, and risk characterization.

Identification of chemicals of potential concern

Ground water, surface water, sediment, and soil data were evaluated and contaminants of concern were selected based on carcinogenicity, detection frequency, comparison with background concentrations, toxicity, physicochemical properties, concentration, and grouping chemicals based on similar chemical structures. Based on this analysis, the chemicals outlined in Table 3 were selected as contaminants of potential concern at the ACS site. The following site contaminants were found to exceed 10-6 excess cancer risk or a hazard quotient of 1:

UPPER AQUIFER GROUND WATER

Volatiles
Chloromethane
Vinyl Chloride
Methylene Chloride
Acetone
1,1-Dichloroethane
1,1-Dichloroethene (cis)
2-Butanone
Trichloroethene

Semivolatiles
*bis(2-Chloroethyl)ether
1,4-Dichlorobenzene
4-Methylphenol
Isophorone
Pentachlorophenol
bis(2-Ethylhexyl)phthalate

Pesticides/PCBs

Table 1

ORGANIC AND INORGANIC CHEMICAL CONCENTRATIONS
AMERICAN CHEMICAL SERVICES RI/FS
GRIFFITH, INDIANA

MATRIX: Ground Water
SOURCE AREA: Upper Aquifer

CHEMICAL	UNITS	CHEMICAL CONCENTRATION MINIMUM	CHEMICAL CONCENTRATION MAXIMUM	CHEMICAL CONCENTRATION ARITHMETIC MEAN	NUMBER SAMPLES ANALYZED TOTAL	NUMBER SAMPLES ANALYZED DETECTED
Volatiles					24	
Chloromethane	ug/l	68.000	68.000	68.00		1
Vinyl Chloride	ug/l	22.000	720.000	374.00		3
Chloroethane	ug/l	3.000	2000.000	442.71		17
Methylene Chloride	ug/l	1.000	7.000	4.00		2
Acetone	ug/l	84000.000	99000.000	91500.00		2
1,1-Dichloroethane	ug/l	6.000	2400.000	981.25		4
Total 1,2-Dichloroethene	ug/l	1.000	400.000	180.67		6
2-Butanone	ug/l	150000.000	220000.000	185000.00		2
Trichloroethene	ug/l	34.000	45.000	39.50		2
Benzene	ug/l	1.000	100000.000	7265.20		15
4-Methyl-2-Pentanone	ug/l	45000.000	54000.000	49500.00		2
2-Hexanone	ug/l	1200.000	1800.000	1500.00		2
Tetrachloroethene	ug/l	160.000	200.000	180.00		2
Toluene	ug/l	21.000	2300.000	725.25		4
Chlorobenzene	ug/l	2.000	96.000	33.60		5
Ethylbenzene	ug/l	52.000	1100.000	476.00		7
Total Xylenes	ug/l	47.000	3000.000	659.57		7
Semi-Volatiles					24	
Phenol	ug/l	3.000	240.000	34.20		10
bis(2-Chloroethyl)ether	ug/l	4.000	250.000	65.67		9
1,3-Dichlorobenzene	ug/l	3.000	3.000	3.00		1
1,4-Dichlorobenzene	ug/l	3.000	10.000	5.50		4
1,2-Dichlorobenzene	ug/l	4.000	33.000	18.50		6
2-Methylphenol	ug/l	2.000	38.000	14.50		4
bis(2-Chloroisopropyl)ether	ug/l	59.000	300.000	143.20		5
4-Methylphenol	ug/l	5.000	2200.000	468.00		5
Isophorone	ug/l	19.000	35.000	26.33		3
2,4-Dimethylphenol	ug/l	6.000	110.000	41.33		3
Benzoic acid	ug/l	2.000	1900.000	323.00		6
Naphthalene	ug/l	2.000	71.000	32.50		6
4-Chloro-3-methylphenol	ug/l	2.000	2.000	2.00		1
2-Methylnaphthalene	ug/l	9.000	27.000	17.00		3
Diethylphthalate	ug/l	3.000	9.000	6.00		2
Pentachlorophenol	ug/l	2.000	3.000	2.50		2
Di-n-butylphthalate	ug/l	2.000	2.000	2.00		1
bis(2-Ethylhexyl)phthalate	ug/l	2.000	50.000	16.33		6
Pesticides/PCBs					24	
AROCLOR-1248	ug/l	2.600	2.600	2.60		1
AROCLOR-1260	ug/l	27.000	27.000	27.00		1

Table 1

ORGANIC AND INORGANIC CHEMICAL CONCENTRATIONS
AMERICAN CHEMICAL SERVICES RI/FS
GRIFFITH, INDIANA

MATRIX: Ground Water
SOURCE AREA: Upper Aquifer

CHEMICAL	UNITS	CHEMICAL CONCENTRATION MINIMUM	CHEMICAL CONCENTRATION MAXIMUM	CHEMICAL CONCENTRATION ARITHMETIC MEAN	NUMBER SAMPLES ANALYZED TOTAL	NUMBER SAMPLES ANALYZED DETECTED
Metals					24	
Aluminum	ug/l	250.000	280.000	265.00		2
Arsenic	ug/l	2.100	43.200	13.59		17
Barium	ug/l	230.000	1840.000	608.75		16
Beryllium	ug/l	0.250	0.250	0.25		1
Cadmium	ug/l	0.240	3.100	0.98		4
Calcium	ug/l	32100.000	1040000.000	176233.33		24
Chromium, Total	ug/l	1.100	3.900	2.43		4
Iron	ug/l	170.000	218000.000	25052.77		22
Lead	ug/l	3.200	4.600	3.90		2
Magnesium	ug/l	7270.000	78800.000	33820.56		18
Manganese	ug/l	281.000	4250.000	2099.00		23
Mercury	ug/l	1.700	1.700	1.70		1
Nickel	ug/l	48.000	53.000	49.67		3
Potassium	ug/l	1480.000	95800.000	13938.75		24
Selenium	ug/l	2.100	6.200	3.47		3
Sodium	ug/l	12700.000	444000.000	145423.81		21
Thallium	ug/l	3.100	4.000	3.55		2
Vanadium	ug/l	2.200	25.900	8.25		8
Zinc	ug/l	10.000	886.000	113.15		20
Cyanide, Total	ug/l	10.000	10.000	10.00		1
Tent. Ident. Compound-SVOC					24	
Unknown	ug/l	6.000	2600.000	249.79		86
Unknown Hydrocarbon	ug/l	36.000	1100.000	418.67		3
Ethylmethylbenzene isomer	ug/l	24.000	130.000	64.00		4
Trimethylbenzene isomer	ug/l	50.000	300.000	172.50		4
Ethyldimethylbenzene isomer	ug/l	32.000	160.000	96.00		2
Undecane, 4,7-dimethyl-	ug/l	120.000	120.000	120.00		1
Benzene, 1,1'-oxybis-	ug/l	24.000	24.000	24.00		1
Benzene, propyl-	ug/l	22.000	22.000	22.00		1
Benzene, 1-ethyl-2-methyl-	ug/l	42.000	88.000	65.00		2
Benzene, 2-ethyl-1,4-dimethyl-	ug/l	6.000	400.000	151.00		4
Unknown Substituted Benzene	ug/l	22.000	110.000	51.00		8
Unknown carboxylic acid	ug/l	22.000	22.000	22.00		1
Tetramethylbenzene isomer	ug/l	120.000	130.000	125.00		2
Benzene, 1,3,5-trimethyl-	ug/l	82.000	280.000	181.00		2
Cyclohexanol, 3,3,5-trimethyl-	ug/l	26.000	2000.000	728.57		7
Hexanoic acid, 2-ethyl-	ug/l	360.000	360.000	360.00		1
Benzene, 1-ethenyl-3-ethyl-	ug/l	18.000	18.000	18.00		1
Hexanoic acid (DOT)	ug/l	740.000	740.000	740.00		1
Dimethylphenol	ug/l	54.000	200.000	127.00		2
Cyclopentanol, 2-methyl-CI...	ug/l	52.000	52.000	52.00		1
Benzene, 1-ethyl-4-methoxy-	ug/l	90.000	90.000	90.00		1
Furan, 2,2'-methylenebis-	ug/l	150.000	150.000	150.00		1
Benzenamine, n,n-diethyl-	ug/l	32.000	32.000	32.00		1

Table 1
ORGANIC AND INORGANIC CHEMICAL CONCENTRATIONS
AMERICAN CHEMICAL SERVICES RI/FS
GRIFFITH, INDIANA

MATRIX: Ground Water
SOURCE AREA: Upper Aquifer

CHEMICAL	UNITS	CHEMICAL CONCENTRATION MINIMUM	CHEMICAL CONCENTRATION MAXIMUM	CHEMICAL CONCENTRATION ARITHMETIC MEAN	NUMBER SAMPLES ANALYZED TOTAL	NUMBER SAMPLES ANALYZED DETECTED
Furan, 2,2'-[oxybis(methylene)]bis,-	ug/l	32.000	54.000	42.67		3
Hexanoic acid, annydride	ug/l	60.000	60.000	60.00		1
1,4-Methanonaphthalene, 1,4-...	ug/l	160.000	160.000	160.00		1
2-Propanol, 1-[2-(2-methoxy-1-methylethoxy)-1-2-propanol	ug/l	110.000	110.000	110.00		1
Hexanoic acid, 2-methyl-	ug/l	720.000	720.000	720.00		1
2,4-Pentanediol, 2-methyl-	ug/l	72.000	1800.000	936.00		2
2-Propanol, 2-(2-methoxy-1-m...	ug/l	90.000	90.000	90.00		1
Benzeneacetic acid, .alpha.-ethyl-	ug/l	58.000	58.000	58.00		1
Pentanoic acid, 4-methyl-	ug/l	1100.000	1100.000	1100.00		1
Disulfide, diethyl-	ug/l	140.000	720.000	430.00		2
3-Octanone	ug/l	86.000	86.000	86.00		1
Benzene, 1-chloro-3-methyl-	ug/l	120.000	120.000	120.00		1
Cyclohexanemethanol, .alpha.-.alpha.-4-trimethyl-	ug/l	220.000	220.000	220.00		1
Unknown substituted phenol	ug/l	28.000	28.000	28.00		1
Phenol, 3-ethyl-5-methyl-	ug/l	50.000	50.000	50.00		1
Benzoic acid, 3-methyl-	ug/l	38.000	38.000	38.00		1
Ethane, 1,2-bis(2-chloroethoxy)-	ug/l	50.000	78.000	64.00		2
Benzene, ethyl-	ug/l	16.000	16.000	16.00		1
Benzene, 1,3-dimethyl-	ug/l	440.000	440.000	440.00		1
Benzene, 1,2-dimethyl-4-(phenylmethyl)-	ug/l	24.000	24.000	24.00		1
Benzene, (1,1-dimethylpropyl...	ug/l	32.000	32.000	32.00		1
Naphthalene, 1,2,3,4-tetrah...	ug/l	52.000	52.000	52.00		1
1(2H)-Naphthalenone, 3,4-dih...	ug/l	12.000	12.000	12.00		1
2-Cyclohepten-1-one	ug/l	92.000	92.000	92.00		1
Benzene, 1-methyl-4-(methyls...	ug/l	14.000	14.000	14.00		1
Glycine, n-(2-methyl-1-oxo-2...	ug/l	12.000	12.000	12.00		1
Phenol, 3,5-dimethyl-	ug/l	12.000	12.000	12.00		1
1,3-Pentanediol, 2,2,4-trimethyl-	ug/l	40.000	40.000	40.00		1
2,4,6(1H,3H,5H)-Pyrimidinetrione-5-(1-methyl)-	ug/l	10.000	130.000	70.00		2
2-Methylcyclopentanol isomer	ug/l	2000.000	2000.000	2000.00		1
Trimethylphenol isomer	ug/l	62.000	62.000	62.00		1
Methylbenzoic acid isomer	ug/l	44.000	420.000	232.00		2
2-Propanol, 1-(2-methoxy-1-methylethoxy)-2-propanol	ug/l	140.000	2200.000	1170.00		2
Propanoic acid, 2-(3-chlorophenoxy)-propanoic acid	ug/l	98.000	98.000	98.00		1
Unknown substituted sulfonyl	ug/l	44.000	44.000	44.00		1
Trimethyl benzoic acid	ug/l	12.000	12.000	12.00		1
Caprolactam	ug/l	10.000	10.000	10.00		1
Octane, 2,3-dimethyl-	ug/l	320.000	720.000	520.00		2
Decane, 2,6,7-trimethyl-	ug/l	320.000	380.000	350.00		2
Nonane, 3,7-dimethyl-	ug/l	180.000	180.000	180.00		1

Table 1

ORGANIC AND INORGANIC CHEMICAL CONCENTRATIONS
AMERICAN CHEMICAL SERVICES RI/FS
GRIFFITH, INDIANA

MATRIX: Ground Water
SOURCE AREA: Upper Aquifer

CHEMICAL	UNITS	CHEMICAL CONCENTRATION MINIMUM	MAXIMUM	ARITHMETIC MEAN	NUMBER SAMPLES ANALYZED TOTAL	DETECTED
Dimethyl undecane	ug/l	170.000	170.000	170.00		1
Methylethylphenol	ug/l	54.000	88.000	71.00		2
Unknown diol	ug/l	82.000	82.000	82.00		1
Chloromethylbenzene	ug/l	68.000	68.000	68.00		1
Disilane, hexaethyl-.	ug/l	46.000	46.000	46.00		1
Unknown alcohol	ug/l	24.000	24.000	24.00		1
Methylpropenylbenzene	ug/l	6.000	6.000	6.00		1
Tetrahydronaphthalene	ug/l	66.000	66.000	66.00		1
2-Cyclohexen-1-one, 3,5,5-trimethyl-	ug/l	32.000	32.000	32.00		1
Benzoic acid, 2,4-dimethyl-	ug/l	24.000	24.000	24.00		1
Benzoic acid, 2,4,6-trimethyl-	ug/l	36.000	36.000	36.00		1
Benzoic acid, 4-(1,1-dimethylethyl)-	ug/l	34.000	34.000	34.00		1
Phenobarbital (VAN)	ug/l	8.000	22.000	15.00		2
Ethyltrimethylbenzene + unknown	ug/l	54.000	54.000	54.00		1
Methylnaphthalene	ug/l	74.000	74.000	74.00		1
Dimethylnaphthalene	ug/l	38.000	38.000	38.00		1
Tent. Ident. Compound-VOC					24	
Unknown	ug/l	29.000	140.000	73.50		8
Benzene, 1-ethyl-2-methyl-	ug/l	70.000	70.000	70.00		1
Benzene, propyl-	ug/l	60.000	60.000	60.00		1
Benzene, (1-methylethyl)-	ug/l	60.000	60.000	60.00		1
Cyclohexane, methyl-	ug/l	40.000	40.000	40.00		1
Ethylmethylbenzene isomer	ug/l	35.000	100.000	59.60		5
Trimethylbenzene isomer	ug/l	130.000	640.000	437.50		4
Benzene, 1,3,5-trimethyl-	ug/l	170.000	170.000	170.00		1
Unknown alcohol	ug/l	700.000	1100.000	900.00		2
Ethane, 1,1'oxybis-	ug/l	4.000	1500.000	264.29		7
2-Propanol, 2-methyl-	ug/l	8.000	8.000	8.00		1
Unknown oxygenated alkane	ug/l	450.000	450.000	450.00		1
Dimethylcyclohexane	ug/l	76.000	76.000	76.00		1
Ethenylcyclohexene	ug/l	63.000	63.000	63.00		1
Diethylbenzene	ug/l	78.000	78.000	78.00		1
Butanol	ug/l	40.000	40.000	40.00		1
Propane, 1,1'-oxybis-	ug/l	6.000	6.000	6.00		1
Methylpentanol	ug/l	15.000	15.000	15.00		1
Methylhexanone	ug/l	7.000	7.000	7.00		1
Cyclohexane, 1,3-dimethyl-, trans-	ug/l	45.000	45.000	45.00		1
Diisopropyl ether (DOT)	ug/l	8.100	8.100	8.10		1

This table includes all compounds identified above detection limits in the Upper Aquifer Source Area (see table 7-1 for samples included in this area), and is provided as the starting point in the development of a Set of Chemical Data for use in the Risk Assessment, as discussed in Section 7.1.2.1. Refer to appropriate appendices to determine the total parameters analyzed and their associated detection limits. Refer to appendix U for values used in risk calulations. The data values presented contain a maximum of three significant digits for the results of metals analyses and two significant digits for organic chemical analyses: additional digits are due to limitations in the computer program used to prepare these tables, and do not infer an increase in accuracy. The number of tentatively identified compounds designated as unknowns may exceed the total number of samples analyzed because more than one unknown compound may be present in a given sample.

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Table 2

ORGANIC AND INORGANIC CHEMICAL CONCENTRATIONS
AMERICAN CHEMICAL SERVICES RI/FS
GRIFFITH, INDIANA

MATRIX: Ground Water
SOURCE AREA: Lower Aquifer

CHEMICAL	UNITS	CHEMICAL CONCENTRATION MINIMUM	MAXIMUM	ARITHMETIC MEAN	NUMBER SAMPLES ANALYZED TOTAL	DETECTED
Volatiles					9	
Chloroethane	ug/l	3.000	440.000	214.33		3
4-Methyl-2-Pentanone	ug/l	3.000	3.000	3.00		1
Semi-Volatiles					9	
bis(2-Chloroethyl)ether	ug/l	11.000	12.000	11.50		2
Metals					9	
Arsenic	ug/l	2.100	8.600	4.06		5
Barium	ug/l	220.000	310.000	255.00		4
Calcium	ug/l	59000.000	151000.000	113266.67		6
Iron	ug/l	152.000	3160.000	1043.33		6
Magnesium	ug/l	19300.000	53100.000	35766.67		6
Manganese	ug/l	123.000	866.000	337.33		6
Mercury	ug/l	0.470	0.470	0.47		1
Potassium	ug/l	960.000	3420.000	1923.33		6
Sodium	ug/l	10000.000	96200.000	40700.00		6
Vanadium	ug/l	2.000	2.000	2.00		1
Zinc	ug/l	10.000	22.000	16.00		2
Tent. Ident. Compound-SVOC					9	
Unknown	ug/l	10.000	3300.000	340.59		17
Cyclohexanol, 3,3,5-trimethyl-	ug/l	2500.000	2500.000	2500.00		1
2-Propanol, 1-[2-(2-methoxy-1-methylethoxy)-1-2-propanol	ug/l	1000.000	1000.000	1000.00		1
2,4-Pentanediol, 2-methyl-	ug/l	270.000	270.000	270.00		1
2-Propanol, 1-(2-methoxy-1-methylethoxy)-2-propanol	ug/l	530.000	530.000	530.00		1
Dimethylbenzoic acid	ug/l	400.000	400.000	400.00		1
Dimethylethylbenzoic acid	ug/l	400.000	400.000	400.00		1
Propanoic acid, 2-(3-chlorophenoxy)-propanoic acid	ug/l	170.000	170.000	170.00		1
Tent. Ident. Compound-VOC					9	
Unknown	ug/l	1200.000	1200.000	1200.00		1
Methane, dimethoxy-	ug/l	6.000	6.000	6.00		1

Table 2

ORGANIC AND INORGANIC CHEMICAL CONCENTRATIONS

AMERICAN CHEMICAL SERVICES RI/FS

GRIFFITH, INDIANA

MATRIX: Ground Water

SOURCE AREA: Lower Aquifer

CHEMICAL	UNITS	CHEMICAL CONCENTRATION			NUMBER SAMPLES ANALYZED	
		MINIMUM	MAXIMUM	ARITHMETIC MEAN	TOTAL	DETECTED
Ethane, 1,1'oxybis-	ug/l	36.000	36.000	36.00		1
Propane, 2,2'-oxybis-	ug/l	10.000	10.000	10.00		1
Substituted methylborane	ug/l	11.000	11.000	11.00		1

This table includes all compounds identified above detection limits in the lower Aquifer Source Area (see table 7-1 for samples included in this area), and is provided as the starting point in the development of a Set of Chemical Data for use in the Risk Assessment, as discussed in Section 7.1.2.1. Refer to appropriate appendices to determine the total parameters analyzed and their associated detection limits. Refer to appendix U for values used in risk calulations. The data values presented contain a maximum of three significant digits for the results of metals analyses and two significant digits for organic chemical analyses: additional digits are due to limitations in the computer program used to prepare these tables, and do not infer an increase in accuracy. The number of tentatively identified compounds designated as unknowns may exceed the total number of samples analyzed because more than one unknown compound may be present in a given sample.

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Benzene
4-Methyl-2-pentanone
Tetrachloroethene
Ethylbenzene

Inorganics
*Arsenic
Beryllium
Manganese
Thallium

total PCBs

TIC Groups
Cyclic Ketones
Dimethyl Ethyl Benzenes
Branched Alkanes
Non-Cyclic Acids

*Also lower aquifer contaminant

SOILS

Volatiles
Vinyl Chloride
Chloroethane
Methylene Chloride
Acetone
1,1-Dichloroethene
1,2-Dichloroethene (cis)
Chloroform
1,2-Dichloroethane
2-Butanone
1,1,1-Trichloroethane
Carbon Tetrachloride
1,2-Dichloropropane
1,1,2-Trichloroethane
Benzene
4-Methyl-2-Pentanone
Tetracholorethene
1,1,2,2-Tetrachloroethane
Toluene
Chlorobenzene
Ethylbenzene
Styrene
Xylenes (mixed)

Inorganics
Antimony
Barium
Cadmium
Chromium (VI)

Semivolatiles
Hexachlorobutadiene
2,6-Dinitrotoluene
2,4-Dinitrotoluene
N-Nitrosodiphenylamine
Hexachlorobenzene
Pentachlorophenol
Di-n-Butylphthalate
bis(2-Ethylhexyl)phthalate
total CPAHs
bis(2-Cholorethyl)ether
1,4-Dichlorobenzene
Isophorone
1,2,4-Trichlorophenol
Naphthalene

Pesticides/PCBs
Alpha-BHC
Beta-BHC
Gamma-BHC (Lindane)
Aldrin
Heptachlor epoxide
Endosulfan I
4,4'-DDE
4,4'-DDD
4,4'-DDT
total PCBs

TIC Groups
Non-Cyclic Acids
Cyclic Ketones
Methyl Propyl Benzenes
Dimethyl Ethyl Benzenes
Nitrogenated Benzenes
Propenyl Benzenes
Ethyl Methyl Benzenes

Diethyl Benzenes
Oxygenated Benzenes
Methylated Naphthalenes
Halogenated Alkanes
n-Chain Alkanes
Branched Alkanes
PCB

Toxicity Assessment

The purpose of the toxicity assessment is to weigh available evidence regarding the potential for particular contaminants to cause adverse effects in exposed individuals and to provide, where possible, an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and/or severity of adverse effects, including carcinogenic and noncarcinogenic effects.

Sixty-four of the one hundred and forty-eight positively identified (nonTIC) contaminants of concern are known, probable or possible human carcinogens. Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in (mg/kg/day)-1, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper bound estimate of the excess lifetime cancer risk associated with exposure at the intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CPFs are derived from results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. The weight of evidence classification and CPF for the contaminants of concern is shown in Tables 3 and 4.

Eighty-four of the one hundred and forty-eight positively identified contaminants of concern have noncarcinogenic toxic effects. USEPA has developed chronic reference doses (RfDs) to indicate the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse health effects to occur. RFDs for noncarcinogenic effects for the contaminants of concern are shown in Tables 3 and 4.

Table 3

SUMMARY OF TOXICITY INFORMATION FOR CHEMICALS OF POTENTIAL CONCERN

American Chemical Services NPL Site
Remedial Investigation
Griffith, Indiana

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (I)	Species/Effect of Concern	Uncertainty Factor (I)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence
TARGET COMPOUND LIST								
VOLATILES								
Chloromethane	--/--	--	--	--	mouse/kidney	C	mouse/kidney	C
Bromomethane	rabbit/neurotoxicity	3000	rat/hyperplasia of forestomach epithelium	1000	--/--	--	--	--
Vinyl chloride	--/--	--	--	--	rat/liver	A	rat/lung	A
Chloroethane	--/--	--	--	--	mouse/kidney	C	mouse/kidney	C
Methylene chloride	rat/--	100	rat/liver toxicity	100	mouse/lung, liver	B2	mouse/liver	B2
Acetone	--/--	--	rat/increased liver & kidney weight, nephro-toxicity	1000	--/--	--	--	--
Carbon disulfide	--	--	rabbit/fetal toxicity	100	--/--	--	--	--
1,1-Dichloroethene	--/--	--	rat/liver lesions	1000	mouse/kidney	C	rat/adrenal	C
1,1-Dichloroethane	cat/kidney damage	1000	rat/none	1000	--/--	C	rat/hemangiosarcoma	C

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence
1,2-Dichloroethene (cis)	--/--	--	rat/decreased hemoglobin & hematocrit	3000	--/--	--	--/--	--
1,2-Dichloroethene (trans)	--/--	--	mouse/increased serum alkaline phophatase	100	--/--	--	--/--	--
Chloroform	--/--	--	dog/liver lesions	1000	mouse/liver	B2	rat/kidney	B2
1,2-Dichloroethane	--/--	--	--/--	--	rat/circulatory system	B2	rat/circulatory system	B2
2-Butanone (methyl ethyl ketone)	rat/CNS	1000	rat/fetotoxicity	1000	--/--	--	--/--	D
1,1,1-Trichloroethane	guinea pig/ hepatotoxicity	1000	guinea pig/ hepatotoxicity	1000	--/--	--	--/--	--
Carbon Tetrachloride	--/--	--	rat/liver lesions	100	several/liver	B2	several/liver	B2
Vinyl acetate	--/--	--	--/--	--	--/--	--	--/--	--
Bromodichloromethane	--/--	--	mouse/renal cytomegaly	1000	--/--	B2	mouse/liver	B2
1,2-Dichloropropane	(data inadequate for quantitative risk assessments)				--/--	B2	mouse/liver	B2
cis-1,3-Dichloropropene	rat/degenerative changes in nasal mucosa	100	rat/increased organ weights	10,000	mouse/benign lung tumors	B2	rat/forestomach, liver, adrenal, thyroid	B2
Trichloroethene	--/--	--	--/--	--	mouse/lung	B2	mouse/liver	B2
Dibromochloromethane	--/--	--	rat/liver lesions	1000	--/--	C	mouse/hepatocellular adenomas or carcinomas	C
1,1,2-Trichloroethane	--/--	--	mouse/clinical chemistry alterations	1000	mouse/liver	C	mouse/liver	C
Benzene	--/--	--	--/--	--	human/leukemia	A	human/leukemia	A
trans-1,3-Dichloropropene	rat/degeneration changes in nasal mucosa	100	rat/increased organ weight	1000	mouse/benign lung tumors	B2	rat/forestomach, liver, adrenal, thyroid	B2

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2)
Bromoform	--/--	--/--	rat/liver effects	1000	--/--	B2	rat/adenomatous polyps or adeno-carcinomas in the large intestine	B2
4-Methyl-2-pentanone	rat/liver & kidney effects	1000	rat/liver & kidney effects	1000	--/--	--	--/--	--
2-Hexanone	Data inadequate							
Tetrachloroethene	--/--	--	mouse/hepato-toxicity	1000	rat, mouse/ leukemia, liver	B2	mouse/liver	B2
1,1,2,2-Tetrachloroethane	--/--	--	--/--	--	mouse/liver	C	mouse/liver	C
Toluene	human/CNS effects eyes, nose irritation	100	rat/CNS effects	1000	--/--	--	--/--	--
Chlorobenzene	rat/liver & kidney effects	10,000	dog/liver & kidney effects	1000	--/--	--	--/--	--
Ethylbenzene	--/--	--	rat/hepatotoxicity, & nephrotoxicity	1000	--/--	--	--/--	--
Styrene	--/--	--	dog/red blood cell & liver effects	1000	rat/leukemia	B2	mouse/lung & bronchi	B2
Xylenes (mixed)	human/CNS effects, nose & throat irritation	100	rat/hyperactivity, decreased body weight & increased mortality at higher dosage	100	--/--	--	--/--	--
SEMIVOLATILES								
Phenol	--/--	--	rat/reduced fetal body weight	100	--/--	--	--/--	--
bis(2-Chloroethyl) ether	--/--	--	mouse/decrease in hemoglobin & possible erythrocyte destruction	1000	mouse/liver	B2	mouse/liver	B2
2-Chlorophenol	--/--	--	rat/reproductive effects	1000	--/--	--	--/--	--

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (I)	Species/Effect of Concern	Uncertainty Factor (I)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2
1,3-Dichlorobenzene	--/--	--	--/--	--	--/--	--	--/--	--
1,4-Dichlorobenzene	rat/liver & kidney effect	1000-	--/--	--	--/--	B2	mouse/liver	B2
Benzyl Alcohol	--/--	--	rat/hyperplasia of the epithelium of the forestomach	1000	--/--	--	--/--	--
1,2-Dichlorobenzene	rat/decreased body weight gain	1000	rat/liver effects	1000	--/--	--	--/--	--
2-Methylphenol	--/--	--	rat/reduced body weight gain, neurotoxicity	1000	--/--	--	--/--	--
bis(2-Chloroisopropyl)ether	--/--	--	mouse/decrease in hemoglobin & possible erythrocyte destruction	1000	--/--	--	--/--	--
4-Methylphenol	--/--	--	rat/reduced body weight gain, neurotoxicity	1000	--/--	--	--/--	--
N-Nitroso-di-n-dipropylamine	--/--	--	--/--	--	--/--	B2	rat/liver	B2
Hexachloroethane	--/--	--	rat/kidney degeneration	100	mouse/liver	C	mouse/liver	C
Nitrobenzene	mouse/hematological, adrenal, renal & hepatic lesions	3000	mouse/hematological, adrenal, renal & hepatic lesions	10,000	--/--	--	--/--	--
Isophorone	--/--	--	dog/kidney lesions	1000	--/--	C	rat/kidney, preputial gland	C
2-Nitrophenol	data inadequate							
2,4-Dimethylphenol	--/--	--	mouse/neurological signs & hematological changes	3000	--/--	--	--/--	--
Benzoic Acid	--/--	--	human/irritation, malaise	1	--/--	--	--/--	--
bis(2-Chloroethoxy)methane	--/--	--	--/--	--	--/--	--	--/--	--

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2)
2,4-Dichlorophenol	--/--	--	rat/immune function	100	--/--	--	--/--	--
1,2,4-Trichlorophenol	--/--	--	--/--	--	--/--	--	--/--	--
Naphthalene	--/--	--	rat/ocular & internal lesions	10,000	--/--	--	--/--	--
4-Chloroaniline	--/--	--	rat/proliferative lesions of the spleen	3000	--/--	--	--/--	--
Hexachlorobutadiene	--/--	--	rat/kidney toxicity	100	rat/kidney	C	rat/kidney	C
4-Chloro-3-methylphenol	--/--	--	--/--	--	--/--	--	--/--	--
2-Methylnaphthalene	--/--	--	--/--	--	--/--	--	--/--	--
Hexachlorocyclopentadiene	rat/respiratory tract lesions	1,000	rat/forestomach lesions	1000	--/--	--	--/--	--
2,4,6-Trichlorophenol	--/--	--	--/--	--	mouse/liver	B2	mouse/liver	B2
2,4,5-Trichlorophenol	--/--	--	rat/decreased survival	300	--/--	--	--/--	--
2-Chloronaphthalene	--/--	--	--/--	--	--/--	--	--/--	--
2-Nitroaniline	--/--	--	--/--	--	--/--	--	--/--	--
Dimethylphthalate	--/--	--	--/--	--	--/--	--	--/--	--
Acenaphthylene	--/--	--	--/--	--	--/--	--	--/--	--
2,6-Dinitrotoluene	--/--	--	--/--	--	--/--	B2	--/--	B2
3-Nitroaniline	--/--	--	--/--	--	--/--	--	--/--	--
Acenaphthene	--/--	--	mouse/hepato-toxicity	3000	--/--	--	--/--	--
2,4-Dinitrophenol	--/--	--	human/cataract	1000	--/--	--	--/--	--
4-Nitrophenol	--/--	--	--/--	--	--/--	--	--/--	--
Dibenzofuran	--/--	--	--/--	--	--/--	--	--/--	--
2,4-Dinitrotoluene	--/--	--	--/--	--	--/--	B2	--/--	B2

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2)
Diethylphthalate	--/--	--	rat/reduced terminal body weight	1000	--/--	--	--/--	--
4-Chlorophenyl-phenylether	--/--	--	--/--	--	--/--	--	--/--	--
Fluorene	--/--	--	mouse/hematological changes	3000	--/--	--	--/--	--
4-Nitroaniline	--/--	--	--/--	--	--/--	--	--/--	--
4,6-Dinitro-2-methylphenol	--/--	--	--/--	--	--/--	--	--/--	--
N-nitrosodiphenylamine	--/--	--	--/--	--	--/--	--	rat/urinary bladder	B2
4-Bromophenyl-phenylether	--/--	--	--/--	--	--/--	--	--/--	--
Hexachlorobenzene	--/--	--	rat/liver & hematologic effects	100	hamster/liver	B2	hamster/liver	B2
Pentachlorophenol	--/--	--	rat/liver & kidney pathology	100	--/--	--	--/--	--
Phenanthrene	--/--	--	--/--	--	--/--	--	--/--	--
Anthracene	--/--	--	mouse/no effects	3000	--/--	--	--/--	--
Di-n-butylphthalate	--/--	--	rat/mortality	1000	--/--	--	--/--	--
Fluoranthene	--/--	--	mouse/nephropathy, liver weight changes, hematological changes	3000	--/--	--	--/--	--
Pyrene	--/--	--	mouse/renal effects	3000	--/--	--	--/--	--
Butylbenzylphthalate	--/--	--	rat/effects on body weight gain, testes, liver, kidney	1000	--/--	--	--/--	C
3,3'-Dichlorobenzidine	--/--	--	--/--	--	--/--	--	rat/mammary	B2
Benzo(a)anthracene(c)	--/--	--	--/--	--	--/--	B2	--/--	B2
Chrysene(c)	--/--	--	--/--	--	--/--	B2	--/--	B2

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (I)	Species/Effect of Concern	Uncertainty Factor (I)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2)
bis(2-ethylhexyl)phthalate	--/--	--	guinea pig/increased relative liver weight	1000	--/--	B2	--/--	B2
Di-n-octyl Phthalate	--/--	--	rat/elevated kidney & liver weights	1000	--/--	--	--/--	--
Benzo(b)fluoranthene(c)	--/--	--	--/--	--	--/--	B2	--/--	B2
Benzo(k)fluoranthene(c)	--/--	--	--/--	--	--/--	B2	--/--	B2
Benzo(a)pyrene(c)	--/--	--	--/--	--	hamster/respiratory tract	B2	mouse/stomach	B2
Ideno(1,2,3-cd)pyrene(c)	--/--	--	--/--	--	--/--	B2	--/--	B2
Dibenz(a,h)anthracene(c)	--/--	--	--/--	--	--/--	B2	--/--	B2
Benzo(g,h,i)perylene	--/--	--	--/--	--	--/--	--	--/--	--
Total-Carcinogenic PAHs(3)	--/--	--	--/--	--	hamster/respiratory tract	B2	mouse/stomach	B2
PESTICIDE/PCB								
alpha-BHC	--/--	--	--/--	--	--/--	--	mouse/liver	B2
beta-BHC	--/--	--	--/--	--	--/--	--	mouse/liver	C
delta-BHC	--/--	--	--/--	--	--/--	--	--/--	--
gamma-BHC (Lindane)	--/--	--	rat/liver & kidney toxicity	1000	--/--	--	mouse/liver	B2
Heptachlor	--/--	--	rat/increased liver weight	300	mouse/liver	B2	mouse/liver	B2
Aldrin	--/--	--	rat/liver lesions	1000	mouse/liver	B2	mouse/liver	B2
Heptachlor epoxide	--/--	--	--/--	--	mouse/liver	B2	mouse/liver	B2
Endosulfan I	--/--	--	rat/mild kidney lesions	3000	--/--	--	--/--	--

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2)
Dieldrin	--/--	--	--/--	--	--/--	B2	mouse/liver	B2
4,4'-DDE	--/--	--	--/--	--	--/--	--	mouse, hamster/liver	B2
Endrin	--/--	--	dog/convulsions & liver lesions	100	--/--	--	--/--	--
Endosulfan II	--/--	--	rat/mild kidney lesions	3000	--/--	--	--/--	--
4,4'-DDD	--/--	--	--/--	--	--/--	--	mouse/liver	B2
Endosulfan sulfate	--/--	--	--/--	--	--/--	--	--/--	--
4,4'-DDT	--/--	--	rat/liver lesions	100	mouse, rat/liver	B2	mouse, rat/liver	B2
Methoxychlor	--/--	--	rat/fetotoxicity	100	--/--	--	--/--	--
Enrin ketone	--/--	--	--/--	--	--/--	--	--/--	--
alpha-Chlordane	--/--	--	rat/liver necrosis	1000	mouse/liver	B2	mouse/liver	B2
gamma-Chlordane	--/--	--	rat/liver necrosis	1000	mouse/liver	B2	mouse/liver	B2
Toxaphene	--/--	--	--/--	--	mouse/liver	B2	mouse/liver	B2
Polychlorinated biphenyls (PCBs)	--/--	--	--/--	--	--/--	--	rat/liver	B2
TARGET ANALYTE LIST								
METALS								
Aluminum	Data Inadequate	--	--/--	--	--/--	--	--/--	--
Antimony	--/cancer	--	rat/reduced life span, altered blood chemistries	1000	--/--	--	--/--	--
Arsenic	--/cancer	--	human/keratosis & hyperpigmentation	1	human/respiratory tract	A	human/skin	A
Barium	--/fetotoxicity	100	rat/increased blood pressure	100	--/--	--	--/--	--

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2)
Beryllium	--/--	--	rat/none observed	100	human/lung	B2	rat/total tumors	B2
Cadmium (water) (4)	--/--	--	human/cancer, renal damage	10	human/respiratory tract	B1	--/--	--
Cadmium (food/soil) (4)	--/--	--	human/cancer, renal damage	10	human/respiratory tract	B1	--/--	--
Calcium	--/--	--	--/--	--	--/--	--	--/--	--
Chromium III	--/--	--	rat/hepatotoxicity	1000	--/--	--	--/--	--
Chromium VI	--/cancer	--	rat/not defined	500	human/lung	A	--/--	--
Cobalt	--/--	--	--/--	--	--/--	--	--/--	--
Copper	--/--	--	human/local GI irritation	--	--/--	--	--/--	--
Iron	Data inadequate	--	--/--	--	--/--	--	--/--	--
Lead	--/CNS effects	--	--/CNS effects	--	--/--	B2	--/--	B2
Magnesium	--/--	--	--/--	--	--/--	--	--/--	--
Manganese	human/CNS	100	rat/reproductive	100	--/--	--	--/--	--
Mercury	human/neurotoxicity	30	rat/kidney effects	1000	--/--	--	--/--	--
Nickel	--/cancer	--	rat/reduced body & organ weight	300	human/respiratory tract	A	--/--	--
Potassium	--/--	--	--/--	--	--/--	--	--/--	--
Selenium	--/--	--	--/--	--	--/--	--	--/--	--
Silver	--/--	--	human/argyria	2	--/--	--	--/--	--
Sodium	--/--	--	--/--	--	--/--	--	--/--	--
Thallium	--/--	--	rat/increased SGOT & serum LDH levels, alopecia	3000	--/--	--	--/--	--
Vanadium	--/--	--	rat/none observed	100	--/--	--	--/--	--

(continued)

Chemical of Potential Concern	Chronic Reference Dose				Slope Factor			
	Inhalation		Oral		Inhalation		Oral	
	Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)	Species/Tumor Site	Weight of Evidence	Species/Tumor Site	Weight of Evidence (2)
inc	--/--	--	rat/weight loss, thyroid effects & myelin degeneration	500	--/--	--	--/--	--
yanide	--/--	--	rat/weight loss, thyroid effects & myelin degeneration	500	--/--	--	--/--	--

(continued)

Chemical Group of Potential Concern	Representative Compound	Chronic Reference Dose			
		Inhalation		Oral	
		Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)
TENTATIVELY IDENTIFIED COMPOUNDS (5)					
Propyl Benzenes	Cumene	rat/CNS involvement, nasal irritation	10,000	rat/renal	3,000
Propenyl Benzenes	Methyl Styrene	mouse/nasal lesions	1000	mouse/nasal lesions	1,000
Ethyl Methyl Benzenes	Ethyl toluene	Data inadequate	--	--/--	--
Diethyl Benzenes	Ethyl benzene	--/--	--	rat/hepatotoxicity, nephrotoxicity	--
Methyl Propyl Benzenes	Cumene	rat/CNS involvement, nasal irritation	10,000	rat/renal	3,000
Methyl Ethenyl Benzenes	Methyl Styrene	mouse/nasal lesions	1,000	mouse/nasal lesions	1,000
Methyl Phenyl Benzenes	Naphthalene	--/--	--	rat/decreased body weight gain	10,000
Trimethyl Benzenes	Trimethyl benzene	Data Inadequate	--	--/--	--
Dimethyl ethyl benzenes	Ethyl benzene	--/--	--	rat/hepatotoxicity, nephrotoxicity	1,000
Tetramethyl Benzenes	Trimethyl benzene	Data Inadequate	--	--/--	--
Oxygenated Benzenes	Benzaldehyde	--/--	--	rat/kidney, forestomach	1,000
Halogenated Benzenes	o-chlorotoluene	--/--	--	rat/decreased body weight gain	1,000

(continued)

Chemical Group of Potential Concern	Representative Compound	Chronic Reference Dose			
		Inhalation		Oral	
		Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)
Nitrogenated Benzenes	Nitrobenzene	mouse/hematological, adrenal, renal & hepatic lesions	300	mouse/hematological, adrenal, renal & hepatic lesions	1,000
Cyclic alkanes	Methylcyclohexane	--/--	--	--/--	--
Cyclic Alkenes	Vinylcyclohexane	--/--	--	--/--	--
Halogenated Alkanes	1,1,1-Trichloroethane	guinea pig/hepatotoxicity	1,000	guinea pig/ hepatotoxicity	1,000
n-chain Alkanes	n-hexane	human/neurotoxicity	300	rat/neuropathy or testicular atrophy	10,000
Branched Alkanes	n-hexane	human/neurotoxicity	300	rat/neuropathy or testicular atrophy	10,000
Branched Alkenes/Alkynes	Vinyl cyclohexene	Data Inadequate	--	--/--	--
Ethers	Ethylether	--/--	--	rat/liver effects	1,000
Methylated Naphthalenes	Naphthalene	--/--	--	rat/decreased body weight gain	10,000
Phthalates	Phthalic anhydride	--/--	--	mouse/lung & kidney histopathology	1,000
Methylated Phenols	Cresol	--/--	--	rat/reduced body weight gain, neurotoxicity	1,000
Methylated Ketones	Acetone	--/--	--	rat/increased liver & kidney weight, nephrotoxicity	1,000
Simple Ketones	2-butanone	rat/CNS	1,000	rat/fetotoxicity	1,000
Cyclic Ketones	Isophorone	--/--	--	dog/kidney lesions	1,000
Diols	Ethylene glycol	--/--	--	rat/mortality, liver & kidney effects	100
Simple Alcohols	1-butanol	--/--	--	rat/effects on erythrocyte	1,000
Straight chain alkenes/alkynes	Vinyl cyclohexene	Data Inadequate	--	--/--	--

(continued)

Chemical Group of Potential Concern	Representative Compound	Chronic Reference Dose			
		Inhalation		Oral	
		Species/Effect of Concern	Uncertainty Factor (1)	Species/Effect of Concern	Uncertainty Factor (1)
Cyclic Alcohols	Benzyl alcohol	--/--	--	rat/hyperplasia of the epithelium of the forestomach	1,000
Oxygenated Alcohols	Ethyl glycol monobutyl ether	rat/altered hemotology	1,000	--/--	--
Cyclic Acids	Benzoic acid	--/--	--	human/irritation, malaise	1
Non-Cyclic Acids	Acrylic acid	mouse/lesions of the nasal mucosa	1,000	rat/reduced body weight, altered organ weights	1,000
Amines	Coprolactam	--/--	--	rat/reduced body weight	100
Polychlorindated Biphenyls (PCBs)	PCBs	--/--	--	--/--	--
Furans	Tetrahydrofuran	--/--	--	mouse/hepatic lesions	1000

NOTES:

1) A reference dose (RFD) is derived from a pertinent toxicity study(s), and is an estimate of the "safe" level of chemical intake over a set length of exposure (e.g., chronic) for humans. Many assumptions must be made when predicting this "safe" chemical intake level (i.e., RFD) from a laboratory study. Uncertainty factors (UFs) are applied when estimating the RFD for the following reasons.

   - A UF of 10 is used to account for variation in the general population and is intended to protect sensitive *subpopulations (e.g., elderly, children)*.
   - A UF of 10 is used when extrapolating from animal data to humans. This factor is intended to account for the interspecies variability between humans and other mammals.
   - A UF of 10 is used when a RFD is derived from a subchronic instead of a chronic toxicity study.
   - A UF of 10 is used when a lowest adverse effect level (LOAEL) is used instead of a no adverse effect level (NOAEL) to derive a RFD. This factor is intended to account for the uncertainty associated with extrapolating from toxic levels of chemical exposure (i.e., LOAEL) to nontoxic levels of chemical exposure (i.e., NOAEL).

   In certain cases, a modifying factor (MF) is used to account for further uncertainty associated with the toxicity study used to develop the RFD. The MF may vary from >0 to 10.

   The uncertainty factors presented in this table represent the product of all the uncertainty factors (and modifying factors) used to derive the RFD (e.g., 10x10x10 = 1000).

2) This code represents the U.S. EPA weight-of-evidence classification system for carcinogenicity for chemicals. The following is a description of the classification by group.

Group	Description
A	Known human carcinogen
B1 or B2	Probable human carcinogen
	B1 indicates that limited human data on the carcinogenicity of the chemical are available.
	B2 indicates sufficient evidence of carcinogenicity in animals and inadequate or no evidence of carcinogenicity in humans exists.
C	Possible human carcinogen
D	Not classifiable as to human carcinogenicity
E	Evidence of noncarcinogenicity for humans

3) The slope factor for benzo(a)pyrene was used to represent the carcinogenic potential of the carcinogenic polynuclear aromatic hydrocarbons (PAHs).

4) Toxicity values have been developed separately for ingestion of cadmium in water and cadmium ingestion with solids (i.e., food or soil).

5) Tentatively identified compounds (TICs) were grouped based on similar chemical structure. Compounds of similar chemical structure are assumed to have similar toxicological properties. For each TIC grouping, a representative compound was chosen for which there was a reference dose (RFD). The RFD for the representative compound was used to represent the toxic potential of the particular TIC group.

6) The information in this table was summarized from U.S. EPA's "Health Effects Assessment Summary Tables" (Fiscal Year - Annual, 1991).

LEGEND

-- = information not available

data inadequate = presently, toxicity data is inadequate for reference dose or slope factor derivation.

Table 4

CHEMICAL TOXICITY VALUES AND ABSORPTION ESTIMATES USED FOR RISK QUANTIFICATION

American Chemical Services NPL Site
Remedial Investigation
Griffith, Indiana

Chemical	Chronic Reference Dose (mg/kg-d)						Slope Factor ($(mg/kg-d)^{-1}$)						Chemical Absorption Estimate (unitless)		Dermal Permeability Constant
	Inhalation		Oral		Dermal		Inhalation		Oral		Dermal		Oral	Dermal	(cm/hr)
VOLATILES															
Chloromethane	ND	D	ND		ND		6.3e-03	H*	1.3e-02	H	2.6e-02		0.50	0.30	1.0e+00
Bromomethane	6.0e-03	H*	1.4e-03	I	7.0e-04		ND		ND		ND		0.50	0.30	1.0e+00
Vinyl chloride	ND		ND		ND		3.0e-01	6	1.9e+00	H*	1.9e+00		1.00	0.30	1.0e+00
Chloroethane	1.0e+00	I*	ND		ND		ND	D	ND		ND		0.50	0.30	8.0e-03
Methylene chloride	3.0e+00	H*	6.0e-02	I	4.8e-02		1.4e-02		7.5e-03	H	9.4e-03		0.80	0.30	1.0e+00
Acetone	ND		1.0e-01	I	9.5e-02		ND		ND		ND		0.95	0.30	1.0e+00
Carbon disulfide	1.0e-02	H*	1.0e-01	H	5.0e-02		ND		ND		ND		0.50	0.30	5.3e-01
1,1-Dichloroethene	ND	2	9.0e-03	I	9.0e-03		1.2e+00	H	6.0e-01	I	6.0e-01		1.00	0.30	1.0e+00
1,1-Dichloroethane	1.0e-01	H	1.0e-01	H	1.0e-01		ND		ND		ND		1.00	0.30	1.0e+00
1,2-Dichloroethene (cis)	ND		1.0e-02	H	9.5e-03		ND		ND		ND		0.95	0.30	1.0e+00
1,2-Dichloroethene (trans)	ND		2.0e-02	H	1.9e-02		ND		ND		ND		0.95	0.30	1.0e+00
Chloroform	ND	2	1.0e-02	I	1.0e-02		8.1e-02	H	6.1e-03	I	6.1e-03		1.00	0.30	1.0e+00
1,2-Dichloroethane	ND		ND		ND		9.1e-02	H	9.1e-02	I	9.1e-02		1.00	0.30	1.0e+00
2-Butanone	9.0e-02	H2	5.0e-02	I	2.5e-02		ND		ND		ND		0.50	0.30	5.0e-03
1,1,1-Trichloroethane	3.0e-01	H2	9.0e-02	I2	9.0e-02		ND		ND		ND		1.00	0.30	1.0e+00
Carbon tetrachloride	ND		7.0e-04	I	6.0e-04		1.3e-01	H	1.3e-01	I	1.5e-01		0.85	0.30	1.0e+00
Vinyl acetate	2.0e-01	I*	1.0e+00	H*	5.0e-01		ND		ND		ND		0.50	0.30	1.0e+00
Bromodichloromethane	ND		2.0e-02	I	1.0e-02		ND		1.3e-01	I	2.6e-01		0.50	0.30	1.0e+00
1,2-Dichloropropane	ND	D	ND		ND		ND		6.8e-02	H	1.4e-01		0.50	0.30	1.0e+00
cis-1,3-Dichloropropene	2.0e-02	H*	3.0e-04	H	1.5e-04		1.3e-01	H	1.8e-01	H	3.6e-01		0.50	0.30	1.0e+00
Trichloroethene	ND		ND		ND		1.7e-02	H	1.1e-02	H	1.1e-02		1.00	0.30	1.0e+00
Dibromochloromethane	ND		2.0e-02	I	1.0e-02		ND		8.4e-02	I	1.7e-01		0.50	0.30	1.0e+00
1,1,2-Trichloroethane	ND		4.0e-03	I	2.0e-03		5.7e-02	H	5.7e-02	I	1.1e-01		0.50	0.30	1.0e+00
Benzene	ND		ND		ND		2.9e-02	H	2.9e-02	I	5.8e-02		0.50	0.30	1.1e-01
trans-1,3-Dichloropropene	2.0e-02	H*	3.0e-04	H	1.5e-04		1.3e-01	H	1.8e-01	H	3.6e-01		0.50	0.30	1.0e+00
Bromoform	ND		2.0e-02	I	1.0e-02		3.9e-03	H	7.9e-03	I	1.6e-02		0.50	0.30	1.0e+00
4-Methyl-2-pentanone	2.0e-02	H2	5.0e-02	H1	2.5e-02		ND		ND		ND		0.50	0.30	1.0e+00
2-Hexanone	ND	D	ND		ND		ND		ND		ND		0.50	0.30	1.0e+00
Tetrachloroethene	ND		1.0e-02	I	1.0e-02		3.3e-03	6	5.1e-02	H	5.1e-02		1.00	0.30	1.0e+00
1,1,2,2-Tetrachloroethane	ND		ND	2	ND		2.0e-01	H	2.0e-01	I	2.1e-01		0.95	0.30	1.0e+00
Toluene	2.0e+00	H*	2.0e-01	I*	2.0e-01		ND		ND		ND		1.00	0.30	1.0e+00
Chlorobenzene	5.0e-03	H2	2.0e-02	I	6.0e-03		ND		ND		ND		0.30	0.30	1.0e+00
Ethylbenzene	1.0e+00	I*	1.0e-01	I	5.0e-02		ND		ND		ND		0.50	0.30	1.4e+00
Styrene	ND		2.0e-01	I2	1.8e-01		2.0e-03	H	3.0e-02	H	3.3e-02		0.90	0.30	6.7e-01
Xylenes (mixed)	3.0e-01	H2*	2.0e+00	I	1.0e+00		ND		ND		ND		0.50	0.30	1.0e+00
Xylenes (m,o)	2.0e-01	H	2.0e+00	H	1.0e+00		ND		ND		ND		0.50	0.30	1.0e+00
Xylenes (p)	3.0e-01	H*	ND		ND		ND		ND		ND		0.50	0.30	1.0e+00

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Chemical	Chronic Reference Dose (mg/kg-d)					Slope Factor ($mg/kg-d)^{-1}$			Chemical Absorption Estimate (unitless)		Dermal Permeability Constant
	Inhalation		Oral		Dermal	Inhalation	Oral	Dermal	Oral	Dermal	(cm/hr)
SEMIVOLATILES											
Phenol	ND		6.0e-01	I	5.4e-01	ND	ND	ND	0.90	0.30	8.2e-03
bis(2-Chloroethyl) ether	ND		ND		ND	1.1e+00 I	1.1e+00 I	2.2e+00	0.50	0.30	5.0e-03
2-Chlorophenol	ND		5.0e-03	I	2.5e-03	ND	ND	ND	0.50	0.30	3.3e-02
1,3-Dichlorobenzene	ND	D	ND		ND	ND	ND	ND	0.50	0.30	5.0e-03
1,4-Dichlorobenzene	7.0e-01	H*	ND		ND	ND	2.4e-02 H	2.4e-02	1.00	0.30	5.0e-03
Benzyl Alcohol	ND		3.0e-01	H	1.5e-01	ND	ND	ND	0.50	0.30	5.0e-03
1,2-Dichlorobenzene	4.0e-02	H	9.0e-02	I	4.5e-02	ND	ND	ND	0.50	0.30	5.0e-03
2-Methylphenol	ND		5.1e-02	I	4.1e-02	ND	ND	ND	0.80	0.30	1.6e-02
bis(2-Chloroisopropyl)ether	ND		4.0e-02	H	2.0e-02	ND	ND	ND	0.50	0.30	5.0e-03
4-Methylphenol	ND		5.0e-02	I	4.0e-02	ND	ND	ND	0.80	0.30	1.8e-02
N-Nitroso-di-n-dipropylamine	ND		ND		ND	ND	7.0e+00 I	1.4e+01	0.50	0.30	5.0e-03
Hexachloroethane	ND		1.0e-03	I	5.0e-04	1.4e-02 I	1.4e-02 I	2.8e-02	0.50	0.30	5.0e-03
Nitrobenzene	2.0e-03	H2*	5.0e-04	I	2.5e-04	ND	ND	ND	0.50	0.30	5.0e-03
Isophorone	ND		2.0e-01	I	1.0e-01	ND	4.1e-03 I*	8.2e-03	0.50	0.30	5.0e-03
2-Nitrophenol	ND		ND		ND	ND	ND	ND	0.50	0.30	1.1e-01
2,4-Dimethylphenol	ND		2.0e-02	I	1.0e-02	ND	ND	ND	0.50	0.30	1.1e-01
Benzoic Acid	ND		4.0e+00	I	3.0e+00	ND	ND	ND	0.75	0.30	5.0e-03
bis(2-Chloroethoxy)methane	ND		ND		ND	ND	ND	ND	0.50	0.30	5.0e-03
2,4-Dichlorophenol	ND		3.0e-03	I	1.5e-03	ND	ND	ND	0.50	0.30	6.0e-02
1,2,4-Trichlorobenzene	3.0e-03	H	1.3e-03	H1	6.6e-04	ND	ND	ND	0.50	0.30	5.0e-03
Naphthalene	ND		4.0e-03	H2	3.4e-03	ND	ND	ND	0.84	0.30	5.0e-03
4-Chloroaniline	ND		4.0e-03	I	2.0e-03	ND	ND	ND	0.50	0.30	5.0e-03
Hexachlorobutadiene	ND		2.0e-03	I	1.0e-03	7.8e-02 I	7.8e-02 I	1.6e-01	0.50	0.30	5.0e-03
4-Chloro-3-methylphenol	ND		ND		ND	ND	ND	ND	0.50	0.30	5.5e-02
2-Methylnaphthalene	ND		ND		ND	ND	ND	ND	0.50	0.30	5.0e-03
Hexachlorocyclopentadiene	2.0e-05	H	7.0e-03	I	3.5e-03	ND	ND	ND	0.50	0.30	5.0e-03
2,4,6-Trichlorophenol	ND	2	ND		ND	1.1e-02 I	1.1e-02 I	2.2e-02	0.50	0.30	5.9e-01
2,4,5-Trichlorophenol	ND	2	1.0e-01	I	5.0e-02	ND	ND	ND	0.50	0.30	5.9e-01
2-Chloronaphthalene	ND		8.0e-02	I	4.0e-02	ND	ND	ND	0.50	0.30	5.0e-03
2-Nitroaniline	ND	D	ND		ND	ND	ND	ND	0.50	0.30	5.0e-03
Dimethylphthalate	ND	1	1.0e+00	H	5.0e-01	ND	ND	ND	0.50	0.30	5.0e-03
Acenaphthylene	ND	D	ND	1	ND	ND	ND	ND	0.50	0.30	5.0e-03
2,6-Dinitrotoluene	ND	D	ND		ND	ND	6.8e-01 H	1.4e+00	0.50	0.30	5.0e-03
3-Nitroaniline	ND	D	ND		ND	ND	ND	ND	0.50	0.30	5.0e-03
Acenaphthene	ND		6.0e-02	I	3.0e-02	ND	ND	ND	0.50	0.30	5.0e-03
2,4-Dinitrophenol	ND		2.0e-03	I	1.0e-03	ND	ND	ND	0.50	0.30	3.2e-03
4-Nitrophenol	ND	D	ND		ND	ND	ND	ND	0.50	0.30	5.6e-03
Dibenzofuran	ND	D	ND		ND	ND	ND	ND	0.50	0.30	5.0e-03

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	Inhalation		Oral		Dermal	Inhalation		Oral		Dermal	Oral	Dermal	(cm/hr)
2,4-Dinitrotoluene	ND	D1	ND		ND	ND		6.8e-01	H1	1.4e+00	0.50	0.30	5.0e-03
Diethylphthalate	ND		8.0e-01	I	4.0e-01	ND		ND		ND	0.50	0.30	1.1e-05
4-Chlorophenyl-phenylether	ND		ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Fluorene	ND		4.0e-02	I	2.0e-02	ND		ND		ND	0.50	0.30	5.0e-03
4-Nitroaniline	ND	D	ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
4,6-Dinitro-2-methylphenol	ND	D	ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
N-nitrosodiphenylamine	ND	D	ND		ND	ND		4.9e-03	I	5.0e-03	0.98	0.30	5.0e-03
4-Bromophenyl-phenylether	ND	D	ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Hexachlorobenzene	ND		8.0e-04	I	4.0e-04	1.6e+00	H	1.6e+00	I	3.2e+00	0.50	0.30	6.4e-04
Pentachlorophenol	ND		3.0e-02	I	2.7e-02	ND		1.2e-01	I*	1.3e-01	0.90	0.30	5.0e-03
Phenanthrene	ND	D	ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Anthracene	ND		3.0e-01	I	1.5e-01	ND		ND		ND	0.50	0.30	5.0e-03
Di-n-butylphthalate	ND	1	1.0e-01	I	9.0e-02	ND		ND		ND	0.90	0.30	2.3e-06
Fluoranthene	ND		4.0e-02	I	2.0e-02	ND		ND		ND	0.50	0.30	5.0e-03
Pyrene	ND		3.0e-02	I	1.5e-02	ND		ND		ND	0.50	0.30	5.0e-03
Butylbenzylphthalate	ND		2.0e-01	I	1.8e-01	ND		ND		ND	0.90	0.30	5.0e-03
3,3'-Dichlorobenzidine	ND		ND		ND	ND		4.5e-01	I	9.0e-01	0.50	0.30	5.0e-03
Benzo(a)anthracene	ND		ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Chrysene	ND	D	ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
bis(2-ethylhexyl)phthalate	ND		2.0e-02	I	5.0e-03	ND		1.4e-02	I	5.6e-02	0.25	0.30	5.7e-06
Di-n-octyl Phthalate	ND		2.0e-02	H	1.0e-02	ND		ND		ND	0.50	0.30	5.0e-03
Benzo(b)fluoranthene	ND		ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Benzo(k)fluoranthene	ND		ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Benzo(a)pyrene	ND		ND		ND	ND	H	ND	H	ND	0.50	0.30	5.0e-03
Ideno(1,2,3-cd)pyrene	ND		ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Dibenz(a,h)anthracene	ND		ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Benzo(g,h,i)perylene	ND		ND		ND	ND		ND		ND	0.50	0.30	5.0e-03
Total Carcinogenic PAHs	ND		ND		ND	6.1e+00	H7	1.2e+01	H7	2.3e+01	0.50	0.30	5.0e-03
PESTICIDE/PCB													
alpha-BHC	ND		ND		ND	6.3e+00	H	6.3e+00	I	1.3e+01	0.50	0.30	1.4e-02
beta-BHC	ND		ND		ND	1.8e+00	H	1.8e+00	I	3.6e+00	0.50	0.30	1.4e-02
delta-BHC	ND	D	ND		ND	ND		ND		ND	0.50	0.30	ND
gamma-BHC (Lindane)	ND		3.0e-04	I	3.0e-04	ND		1.3e+00	H	1.3e+00	1.00	0.30	1.3e-02
Heptachlor	ND		5.0e-04	I	3.5e-04	4.5e+00	H	4.5e+00	I	6.4e+00	0.70	0.30	ND
Aldrin	ND		3.0e-05	I	1.5e-05	1.7e+01	H	1.7e+01	I	3.4e+01	0.50	0.30	1.5e-03
Heptachlor epoxide	ND		1.3e-05	I*	6.5e-06	9.1e+00	H	9.1e+00	I	1.8e+01	0.50	0.30	1.5e-03
Endosulfan I	ND		6.0e-05	H	2.5e-05	ND		ND		ND	0.50	0.30	ND
Dieldrin	ND		5.0e-05	I	2.5e-05	1.6e+01	H	1.6e+01	I	3.2e+01	0.50	0.30	ND

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	Inhalation	Oral	Dermal	Inhalation	Oral	Dermal	Oral	Dermal	(cm/hr)
4,4'-DDE	ND	ND	ND	ND	3.4e-01 I	3.8e-01	0.90	0.30	1.8e-01
Endrin	ND	3.0e-04 I	1.5e-04	ND	ND	ND	0.50	0.30	ND
Endosulfan II	ND	5.0e-05 H	2.5e-05	ND	ND	ND	0.50	0.30	ND
4,4'-DDD	ND	ND	ND	ND	2.4e-01 H	4.8e-01	0.50	0.30	3.0e-01
Endosulfan sulfate	ND	5.0e-05 HB	2.5e-05	ND	ND	ND	0.50	0.30	ND
4,4'-DDT	ND	5.0e-04 I	2.5e-04	3.4e-01 H	3.4e-01 I	6.8e-01	0.50	0.30	3.0e-01
Methoxychlor	ND	5.0e-03 I*	2.5e-03	ND	ND	ND	0.50	0.30	ND
Endrin ketone	ND	ND	ND	ND	ND	ND	0.50	0.30	ND
alpha-Chlordane	ND	6.0e-05 H	3.0e-05	1.3e+00 H	1.3e+00 H	2.6e+00	0.50	0.30	ND
gamma-Chlordane	ND	6.0e-05 H	3.0e-05	1.3e+00 H	1.3e+00 H	2.6e+00	0.50	0.30	ND
Toxaphene	ND	ND	ND	1.1e+00 H	1.1e+00 I	2.2e+00	0.50	0.30	ND
PCB	ND	ND	ND	ND	7.7e+00 H	2.6e+01	0.30	0.08	5.3e-01
METALS									
Aluminum	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Antimony	ND	4.0e-04 I	2.0e-05	ND	ND	ND	0.05	0.01	1.5e-03
Arsenic	ND	1.0e-03 H2	9.5e-04	5.0e+01 H	1.8e+00 6	1.9e+00	0.95	0.01	1.5e-03
Barium	1.0e-04 H	7.0e-02 I*	3.5e-03	ND	ND	ND	0.05	0.01	1.5e-03
Beryllium	ND	5.0e-03 I	5.0e-04	ND I1*	4.3e+00 I	4.3e+01	0.10	0.01	1.5e-03
Cadmium (water)	ND 2	5.0e-04 I	3.5e-05	ND I1*	ND	ND	0.07	0.01	1.5e-03
Cadmium (food/soil)	ND 2	1.0e-03 I	7.0e-05	ND I1*	ND	ND	0.07	0.01	1.5e-03
Calcium	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Chromium III	2.0e-06 H	1.0e+00 H	5.0e-01	ND	ND	ND	0.50	0.01	2.1e-03
Chromium VI	2.0e-06 H2*	5.0e-03 I	2.5e-03	ND I1*	ND	ND	0.50	0.01	2.1e-03
Cobalt	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Copper	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Iron	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Lead	ND	ND 1	ND	ND	ND	ND	0.50	0.01	1.5e-03
Magnesium	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Manganese	4.0e-04 I*	1.0e-01 I*	4.0e-03	ND	ND	ND	0.04	0.01	1.5e-03
Mercury	3.0e-04 H2*	3.0e-04 H2	4.5e-05	ND	ND	ND	0.15	0.01	1.5e-03
Nickel	ND	2.0e-02 I2	2.0e-03	8.4e-01 4	ND	ND	0.10	0.01	1.5e-03
Potassium	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Selenium	ND	ND 2	ND	ND	ND	ND	1.00	0.01	1.5e-03
Silver	ND	3.0e-03 I	3.0e-04	ND	ND	ND	0.10	0.01	1.5e-03
Sodium	ND	ND	ND	ND	ND	ND	0.05	0.01	1.5e-03
Thallium	ND	7.0e-05 H	3.5e-06	ND	ND	ND	0.05	0.01	1.5e-03
Vanadium	ND	7.0e-03 H	3.5e-04	ND	ND	ND	0.05	0.01	1.5e-03
Zinc	ND	2.0e-01 H2	6.0e-02	ND	ND	ND	0.30	0.01	1.5e-03

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	Inhalation		Oral		Dermal	Inhalation	Oral	Dermal	Oral	Dermal	(cm/hr)
Cyanide	ND		2.0e-02	I	1.4e-02	ND	ND	ND	0.70	0.01	1.5e-03
TIC Groupings											
Propyl Benzenes	9.0e-03	H*	4.0e-02	H	2.0e-02	ND	ND	ND	0.50	0.30	1.0e+00
Propenyl Benzenes	1.0e-02	H	6.0e-03	H	3.0e-03	ND	ND	ND	0.50	0.30	1.0e+00
Ethyl Methyl Benzenes	2.0e+00	H*	2.0e-01	I*	2.0e-01	ND	ND	ND	1.00	0.30	1.0e+00
Diethyl Benzenes	1.0e+00	I*	1.0e-01	I	5.0e-02	ND	ND	ND	0.50	0.30	1.4e+00
Methyl Propyl Benzenes	9.0e-03	H*	4.0e-02	H	2.0e-02	ND	ND	ND	0.50	0.30	1.0e+00
Methyl Ethenyl Benzenes	1.0e-02	H	6.0e-03	H	3.0e-03	ND	ND	ND	0.50	0.30	5.0e-03
Methyl Phenyl Benzenes	ND		4.0e-03	H2	3.4e-03	ND	ND	ND	0.84	0.30	5.0e-03
Trimethyl Benzenes	5.7e-01		4.0e-01		4.0e-01	ND	ND	ND	1.00	0.30	1.0e+00
Dimethyl ethyl benzenes	1.0e+00	I*	1.0e-01	I	5.0e-02	ND	ND	ND	0.50	0.30	1.4e+00
Tetramethyl Benzenes	5.7e-01		4.0e-01		4.0e-01	ND	ND	ND	1.00	0.30	1.0e+00
Oxygenated Benzenes	ND		1.0e-01	H	5.0e-02	ND	ND	ND	0.50	0.30	1.0e+00
Halogenated Benzenes	ND		2.0e-02	H	1.0e-02	ND	ND	ND	0.50	0.30	5.0e-03
Nitrogenated Benzenes	2.0e-03	H2*	5.0e-04	I	2.5e-04	ND	ND	ND	0.50	0.30	1.0e+00
Cyclic alkanes	ND	D	ND		ND	ND	ND	ND	0.50	0.00	1.0e+00
Cyclic Alkenes	ND	D	ND		ND	ND	ND	ND	0.50	0.00	1.0e+00
Halogenated Alkanes	3.0e-01	H2	9.0e-02	I2	9.0e-02	ND	ND	ND	1.00	0.30	1.0e+00
n-chain Alkanes	2.0e-01	H*	6.0e-02	H*	3.0e-02	ND	ND	ND	0.50	0.30	1.0e+00
Branched Alkanes	2.0e-01	H*	6.0e-02	H*	3.0e-02	ND	ND	ND	0.50	0.30	1.0e+00
Branched Alkenes/Alkynes	ND	D	ND		ND	ND	ND	ND	0.50	0.00	1.0e+00
Ethers	ND		5.0e-01	H	2.5e-01	ND	ND	ND	0.50	0.30	1.7e-02
Methylated Naphthalenes	ND		4.0e-03	H2	3.4e-03	ND	ND	ND	0.84	0.30	5.0e-03
Phthalates	ND		2.0e+00	H	1.0e+00	ND	ND	ND	0.50	0.30	5.0e-03
Methylated Phenols	ND		5.1e-02	I	4.1e-02	ND	ND	ND	0.80	0.30	1.8e-02
Methylated Ketones	ND		1.0e-01	I	9.5e-02	ND	ND	ND	0.95	0.30	1.0e+00
Simple Ketones	9.0e-02	H2	5.0e-02	I	2.5e-02	ND	ND	ND	0.50	0.30	1.0e+00
Cyclic Ketones	ND		2.0e-01	I	1.0e-01	ND	4.1e-03	I* 8.2e-03	0.50	0.30	1.0e+00
Diols	ND		2.0e+00	H	1.0e+00	ND	ND	ND	0.50	0.30	5.0e-03
Simple Alcohols	ND		1.0e-01	H	5.0e-02	ND	ND	ND	0.50	0.30	1.0e+00
Cyclic Alcohols	ND		3.0e-01	H	1.5e-01	ND	ND	ND	0.50	0.30	5.0e-03
Oxygenated Alcohols	2.0e-02	H	ND		ND	ND	ND	ND	0.50	0.30	5.0e-03
Cyclic Acids	ND		4.0e+00	I	3.0e+00	ND	ND	ND	0.75	0.30	5.0e-03
Non-Cyclic Acids	3.0e-04	H	8.0e-02	H	4.0e-02	ND	ND	ND	0.50	0.30	1.0e+00
Amines	ND		5.0e-01	H	2.5e-01	ND	ND	ND	0.50	0.30	1.0e+00
PCBs	ND		ND		ND	ND	7.7e+00	H 2.6e+01	0.30	0.00	5.0e-03
Furans	ND		2.0e-03		1.0e-03	ND	ND	ND	0.50	0.30	1.0e+00

CHEMICAL TOXICITY VALUES AND ABSORPTION ESTIMATES
USED FOR RISK QUANTIFICATION

American Chemical Services NPL Site
Remedial Investigation
Griffith, Indiana

Notes:

Toxicity values were obtained from the U.S. EPA's Integrated Risk Information System (IRIS), U.S. EPA's "Health Effects Assessment Summary Tables" (HEAST, Annual FY-1991), and information provided by U.S.EPA Environmental Criteria Assessment Office (ECAO). Toxicity values for the TIC groupings are values for the representative compounds.

Chemical specific information pertaining to the oral and dermal absorption of compounds was provided by ECAO. In the absence of chemical specific values, it was assumed that the oral absorption efficiency for organic compounds and metals was 50 % and 5 %, respectively. The dermal absorption estimates were assumed to be 30% for organic compounds and 1.0 % for metals. The oral and dermal absorption estimates are presented as unitless values where 1.0 represents 100 % (complete) absorption. Chemical-specific dermal permeability constants were obtained from the U.S. EPA "Superfund Exposure Assessment Manual" (SEAM) 1988, or the ECAO. As required by the U.S.EPA, when chemical-specific information is not available, default values were assigned to represent chemical permeability, as footnoted.

Reference Doses and Slope Factors designated for the dermal route of exposure are not provided in the U.S. EPA information sources, but were calculated from corresponding values for the oral route of exposure. These values are used to calculate risks associated with chemical dose estimates based on an absorbed (in contrast to an administered) level of chemical. All chemical dose estimates for the dermal route of exposure are based on absorbed chemical levels. The following relationships were used to derive dermal toxicity values:

Oral Reference Dose (administered) x Oral Absorption Estimate = Dermal Reference Dose (absorbed)
Oral Slope Factor (administered) / Oral Absorption Estimate = Dermal Slope Factor (absorbed)

FOOTNOTES - (listed to the right of the value)

1 = Verified in IRIS 5/15/91
H = Values from HEAST FY-1991
D = 'Data inadequate for quantitative risk assessment' (HEAST); applies to all RfDs for this compound.
ND = Value not determined for this compound.
C = Values from Interim Guidance for Dermal Exposure Assessment. (OHEA-E-367, 3/91, Review Draft)
S = Values from the Superfund Environmental Assessment Manual (EPA/540/1-88/001) Table A-4.
* = Value updated 5/91 (Revised from draft risk assessment)
1 = Value withdrawn by IRIS pending further review.
2 = Compound under IRIS review.
3 = Total carcinogenic PAHs; RfDs and SF values from Benzo[a]pyrene used.
4 = Nickel slope factor for nickel refinery dust.
5 = IRIS not queried for this compound
6 = Values from ECAO Technical Support Center.
7 = Baranowska-Dutkiewic, B. 1981. Absorption of Hexavalent Chromium in Man. Arch. Toxicol., 47: 47-50.
8 = Value for endosulfan used for endosulfan sulfate.
Dermal Permeability Constant Default Values:
Volatiles - Toluene (1.01e+00) as required by U.S.EPA.
Semivolatiles - 2-Butanone (5.0e-03) as required by U.S.EPA.
Pesticides - Values from ECAO. Total PCBs use Aroclor 1248.
Inorganics - water (1.5e-03)

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It is important to note that risks due to exposure to lead in soils and waste areas were not evaluated because USEPA has not developed a CPF or RfD for lead. Until a CPF or RfD is developed, USEPA is using the Agency for Toxic Substances and Disease Registry's finding that lead levels of 500 to 1,000 mg/kg in soils can cause increased blood lead levels in children as a basis for assessing risks due to lead. Lead concentrations in waste areas and in some other site soils exceed 500 mg/kg and thus may result in adverse health effects under the scenarios discussed below. U.S. EPA now believes that the best approach in evaluating lead contamination involves using the Uptake Biokinetic Model as a risk assessment tool to predict blood lead levels and develop appropriate clean-up standards. Specific clean-up standards may be modified during design based upon the results of this model.

Exposure Assessment

The exposure assessment identified potential pathways for contaminants of concern to reach the receptors and the estimated contaminant concentration at the point of exposure. Estimated exposures to contaminated media were calculated based on a reasonable maximum exposure (RME) scenario, in accordance with the National Contingency Plan (NCP, 40 CFR Part 300), under both current and projected future land use conditions. The exposure pathways evaluated in the BlRA are summarized in Table 5.

The current land use scenario takes into account that there are residents who have access now and will have access in the future to contaminated areas of the site. It is therefore plausible that off-site residents, including trespassers, may be exposed to contaminants at the site. ACS continues to operate and thus, site employees represent a population potentially exposed to site contamination.

The future land use scenario takes into account that the site is zoned general industrial. However, there is residential zoning adjacent to the site and some residences exist within the industrial zoned areas. It may therefore be possible that the site, or areas near the site, could be developed for residential use.

<u>Current-Use Conditions - Off-Site Residents</u>

Zoning in the immediate vicinity of ACS is industrial, light industrial, or residential. The current use exposure assessment evaluated the following pathways for Off-Site Residents: incidental ingestion and dermal contact of upper aquifer ground water; ingestion, dermal contact, and inhalation of lower aquifer ground water; inhalation of volatile emissions released from subsurface contaminants; and inhalation of fugitive dusts from surface contaminants.

Table 5

Exposure Pathway Analysis
American Chemical Services RI/FS
Griffith, Indiana

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
CURRENT LAND USE CONDITIONS			
Off-Site residents adjacent to Site.	Ingestion of groundwater from the upper aquifer.	No	Surveys performed at homes adjacent to the Site indicate those with wells in the shallow aquifer do not use them for drinking water; the municipal system is used.
Off-Site residents adjacent to Site.	Dermal contact and incidental ingestion of groundwater from the upper aquifer.	Yes	Some homes adjacent to the Site maintain wells in the upper aquifer and use the water for lawn care and gardening. If contaminated groundwater were to migrate to the off-Site wells, exposure may be possible for garden produce and subsequent human consumption. In addition, children may play in the water (e.g., in swimming pools) and become exposed dermally or through incidental ingestion. However, no testing was performed for these wells because they are not used for drinking water and because if contamination were found, it would be difficult to determine the source, in a region where there exists many industries. Also, the flow of groundwater in the upper aquifer is diverted towards the excavation near the active landfill and by the wetlands which surround the Site, both serving to control off-Site migration of contaminants. Nonetheless, if contaminants in the shallow aquifer migrate to off-Site locations, residents adjacent to the Site may occasionally be exposed, therefore, this pathway was included in the risk assessment.

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Off-Site residents adjacent to Site.	Ingestion and/or other potential exposures to groundwater from the lower aquifer.	Yes	Eight private wells located in the deep aquifer were analyzed during the RI and had no detectable levels of contamination. The ACS and landfill facilities both maintain wells in the lower aquifer; the landfill facility uses their well for drinking water, the use of the well at ACS is for industrial purposes as well as drinking water. There is retardation of contaminant migration vertically due to the confining layer. The potential for exposure to the groundwater in the lower aquifer is considered to be low. Nonetheless, contaminants detected in the lower aquifer were assumed to migrate to off-Site locations where exposure may occur.
Off-Site residents adjacent to Site.	Inhalation of volatiles emissions released from subsurface contaminants.	Yes	The amount of VOCs eminating from the contaminated soils is expected to be low compared to that from the ACS facility and from the air in this region of heavy industry. No samples were taken in the field because of the difficulty in distinguishing air pollutant sources and anthropogenic background. It should be recognized that volatiles released from the Site may pose an exposure to off-Site residents. Predicting the amount of exposure quantitatively would be difficult given the current conditions. Nonetheless, an emission and dispersion model was used to estimate potential releases to air from subsurface contamination.
Off-Site residents adjacent to Site.	Inhalation of fugitive dusts emanating from surface contamination at Kapica/Pazmey.	Yes	There exist unvegetated areas of surface soil contamination at Kapica/Pazmey. These soils may be disturbed via wind erosion and disperse contaminated particulates to off-Site locations. The greatest impact is likely to be on-Site. A particulate erosion and dispersion model has been used to estimate exposure from this pathway.
Off-Site residents adjacent to Site.	Ingestion of garden vegetables and fruits.	No	This pathway was not considered to present substantial risk.
Off-Site residents adjacent to Site.	Fishing, hunting and trapping; terrestrial and aquatic species for consumption.	No	The wetlands do not support fish populations. Hunting and trapping are considered low potential exposure pathways because of small user groups.
Adolescents playing (trespassing) on-Site.	Inhalation of volatiles released from the Site.	Yes	Similar to off-Site residents, estimating exposure via this pathway under current conditions utilized an emissions and dispersion model.

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Adolescents playing (trespassing) on-Site.	Inhalation of fugitive dusts at Kapica/Pazmey.	Yes	Wind erosion may contribute to the total exposure for a trespasser coming on-Site at Kapica/Pazmey.
Adolescents playing (trespassing) on-Site.	Incidental ingestion of, and dermal contact with, contaminated soils on-Site.	Yes	Surface contamination is evident at Kapica/Pazmey. Children playing (trespassing) on-Site at this location may be exposed occasionally via the pathways indicated. Other areas of the RI/FS Site where contaminated soils exist are covered with clean material and/or have extreme access limitations (i.e., ACS).
Adolescents playing (trespassing) on-Site.	Incidental ingestion of, and dermal contact with, contaminants detected in wetland surface water and sediments and in drainage ditches.	Yes	This pathway is evaluated to assess the risks associated with surface water and sediment. Contamination has been detected in these media.
On-Site workers at the ACS facility.	Direct contact with soils, sediments and lagoon waters.	No	Contaminated soils and sediments have been covered by clean cover material and/or building construction. The surface water in the lagoon has been analyzed and indicates low contamination. The lagoon is the only surface water feature on the Site. In addition, workers on-Site wear health and safety protection, and must comply with OSHA safety requirements.
On-Site workers at the ACS facility.	Inhalation of airborne contaminants emanating from the Site.	Fugitive Dusts - Yes Volatiles - Yes	Contaminated soils are covered by clean cover material effectively minimizing the potential for generation of contaminated fugitive dust. Volatiles released from subsurface soils to the ambient air may occur, however, exposure to volatiles released from operating processes is likely more substantial. Analysis of volatiles released from subsurface soils has not been performed because of the difficulty in obtaining meaningful estimates of exposure point concentrations given the contributions of pollutants to the air from the ACS facility and anthropogenic background. Nonetheless, emissions and dispersion models have been used to estimate release of volatile contaminants from subsurface materials to the air.
On-Site workers at the ACS facility.	Ingestion and/or other potential exposures to groundwater from the lower aquifer.	No	ACS maintains 4 wells in the deep aquifer, more than 300 ft below the ground surface, in bedrock.

(continued)

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
---------- POTENTIAL FUTURE LAND USE CONDITIONS ----------			
Hypothetical resident living on-Site.	Ingestion of and dermal contact with groundwater from the upper aquifer. Inhalation of volatiles released while showering.	Yes	Hypothetical.
	Ingestion of and dermal contact with groundwater from the lower aquifer. Inhalation of volatiles released while showering.	Yes	Hypothetical.
	Dermal contact with and incidental ingestion of unearthed subsurface soils.	Yes	Hypothetical - to address risks associated with subsurface soils, it was assumed that contaminated subsurface soils are unearthed and present direct exposure potential to residents living on-Site.
	Direct contact with and incidental ingestion of sediments.	Yes	Similar exposure as current use scenario.
	Direct contact (dermal and incidental ingestion) with surface water.	Yes	Similar exposure as current use scenario.
	Inhalation of volatiles released to air on-Site.	Yes	24-hour/day exposure to volatiles.
	Inhalation of particulate released from unearthed subsurface soils.	No	Assume vegetative cover in residential setting minimizes this pathway; addressed under current use scenario.

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Current-Use Conditions - Trespassers

The current-use exposure assessment evaluated the following pathways for Trespassers: inhalation of volatiles and fugitive dusts released from the site; incidental ingestion and dermal contact with contaminated soils on-site; incidental ingestion of and dermal contact with contaminants detected in wetlands, surface water and sediments in drainage ditches.

Current-Use Conditions - On-site Workers at ACS Facility

The current-use exposure assessment evaluated the following pathways for on-site workers: inhalation of volatiles and fugitive dusts released from the site.

Future-Use Conditions

The future-use exposure assessment evaluated the following pathways for a resident living on-site: ingestion and dermal contact of contaminated ground water from the lower or upper aquifer; inhalation of volatiles released from contaminated lower or upper aquifer; dermal contact and incidental ingestion of contaminated soils, sediments and surface water; inhalation of volatiles released to ambient air.

Risk Characterization

The risk characterization combines the chronic daily intakes developed in the exposure assessment with the toxicity information collected in the toxicity assessment to assess potential human health risks from contaminants at the site. For carcinogens, results of the risk assessment are presented as an excess lifetime cancer risk, or the probability that an individual will develop cancer as a result of a 70-year lifetime exposure to site contaminants. These risks are probabilities that are generally expressed in scientific notation (e.g. 1 x 10-6 or 1E-06). An excess lifetime cancer risk of 1 x 10-6 indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of exposure to conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for

gauging the potential significance of multiple exposures within a single medium or across media.

Results of the risk characterization are detailed in Table 6 and discussed below.

Current-Use Conditions

The greatest calculated potential risk under current-use conditions was to children exposed to contaminated upper aquifer ground water. Dermal absorption exposure to contaminated ground water results in an excess cancer risk of 1.7 x 10-2. Benzene contributes 80 percent of this risk, with vinyl chloride contributing almost 17 percent. Non-cancer health effects were at a level of concern primarily from dermal contact to 4-methyl-2-pentanone.

For trespassing children, the total excess cancer risk is 6.3 x 10-3, mainly from dermal absorption exposure to PCB-contaminated soils. Noncancer health effects are also unacceptable due to the inhalation and dermal absorption pathways for a number of contaminants.

For on-site ACS workers, the total excess cancer is 1.6 x 10-3, mainly due to volatiles emanating from buried wastes (based on modeling). Most of this risk comes from 1,1 dichloroethene, chloroform, and carbon tetrachloride. Noncancer health effects are also unacceptable for the inhalation pathway due to non-cyclic acids and vinyl chloride.

For adult off-site residents, the total lifetime excess cancer risk for all pathways was 4.5 x 10-4. Most of this risk comes from ingestion of arsenic and bis(2-chloroethyl)ether in lower aquifer ground water and inhalation of several volatile compounds. Noncancer health effects are also unacceptable for the inhalation pathway due to a number of contaminants.

Future-Use Conditions

If a home with a private well were built on the following locations at the site, residents would be exposed to the following lifetime excess cancer risk: 9.7 x 10-2 for the On-site Containment Area; 1.3 x 10-1 for the Still Bottoms/Treatment Lagoon Area; 2.4 x 10-1 for the Off-site Containment Area; and 1.1 x 10-1 for the Kapica/Pazmey Area. Future site residents would also be exposed to unacceptable noncancer health effects at all locations.

Table 6

SUMMARY OF HAZARD INDICES AND CANCER RISKS FOR POTENTIALLY EXPOSED POPULATIONS
American Chemical Services NPL Site
Remedial Investigation
Griffith, Indiana

Population/Exposure Pathway	Table Number	Hazard Indices			Cancer Risks		
		Ingestion	Dermal Absorption	Inhalation	Ingestion	Dermal Absorption	Inhalation
CURRENT LAND USE CONDITIONS							
Off-Site Resident-Adult							
Groundwater, Lower Aquifer	7-19	8.1e-01	2.7e-02	3.5e-01	2.6e-04	1.6e-06	2.7e-05
Ambient Air, VOC	7-20	-	-	9.3e-01	-	-	1.6e-04
Ambient Air, Dust	7-21	-	-	3.4e-04	-	-	5.2e-09
Population Total			2.1e+00			4.5e-04	
Off-Site Resident-Child							
Groundwater, Upper Aquifer	7-22	3.2e+00	1.5e+02	-	2.8e-04	1.7e-02	-
Population Total			1.5e+02			1.7e-02	
Trespasser-Child							
Surface Soils, Kapica-Pazmey	7-23	3.7e-01	1.2e+01	-	9.3e-05	5.5e-03	-
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	8.7e-02	-	3.5e-06	2.1e-04	
Ambient Air, VOC	7-26	-	-	5.3e+00	-	-	2.9e-04
Ambient Air, Dust	7-27	-	-	3.9e-04	-	-	2.0e-09
Population Total			1.9e+01			6.3e-03	
ACS Worker							
Ambient Air, VOC	7-28	-	-	9.9e+00	-	-	1.6e-03
Ambient Air, Dust	7-29	-	-	7.4e-04	-		1.1e-08
Population Total			9.9e+00			1.6e-03	

(Continued)

Population/Exposure Pathway	Table Number	Hazard Indices			Cancer Risks		
		Ingestion	Dermal Absorption	Inhalation	Ingestion	Dermal Absorption	Inhalation
FUTURE LAND USE CONDITIONS							
On-Site Resident - On-Site Containment Area							
Groundwater, Lower Aquifer	7-30	9.3e-01	3.1e-02	3.5e-01	3.5e-04	2.1e-06	3.9e-05
Groundwater, Upper Aquifer	7-31	2.0e+02	2.0e+01	1.1e+02	6.0e-02	9.7e-03	1.7e-02
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	8.7e-02	-	3.5e-06	2.1e-04	
Ambient Air, VOC	7-32	-	-	1.6e+01	-	-	2.7e-03
Soils	7-33	1.2e+00	4.9e+01	-	1.9e-04	6.6e-03	-
Population Total*			4.0e+02			9.7e-02	
On-Site Resident - Still Bottoms and Treatment Lagoons							
Groundwater, Lower Aquifer	7-30	9.3e-01	3.1e-02	3.5e-01	3.5e-04	2.1e-06	3.9e-05
Groundwater, Upper Aquifer	7-31	2.0e+02	2.0e+01	1.1e+02	6.0e-02	9.7e-03	1.7e-02
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	8.7e-02	-	3.5e-06	2.1e-04	
Ambient Air, VOC	7-32	-	-	1.6e+01	-	-	2.7e-03
Soils	7-34	8.3e+00	4.1e+02	-	8.8e-04	3.8e-02	-
Population Total*			7.7e+02			1.3e-01	
On-Site Resident - Off-Site Containment Area							
Groundwater, Lower Aquifer	7-30	9.3e-01	3.1e-02	3.5e-01	3.5e-04	2.1e-06	3.9e-05
Groundwater, Upper Aquifer	7-31	2.0e+02	2.0e+01	1.1e+02	6.0e-02	9.7e-03	1.7e-02
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	8.7e-02	-	3.5e-06	2.1e-04	
Ambient Air, VOC	7-32	-	-	1.6e+01	-	-	2.7e-03
Soils	7-35	1.8e+01	1.0e+03	-	3.3e-03	1.5e-01	-
Population Total*			1.4e+03			2.4e-01	

(Continued)

Population/Exposure Pathway	Table Number	Hazard Indices			Cancer Risks		
		Ingestion	Dermal Absorption	Inhalation	Ingestion	Dermal Absorption	Inhalation
On-Site Resident - Surface Soils, Kapica-Pazmey							
Groundwater, Lower Aquifer	7-30	9.3e-01	3.1e-02	3.5e-01	3.5e-04	2.1e-06	3.9e-05
Groundwater, Upper Aquifer	7-31	2.0e+02	2.0e+01	1.1e+02	6.0e-02	9.7e-03	1.7e-02
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	8.7e-02	-	3.5e-06	2.1e-04	
Ambient Air, VOC	7-32	-	-	1.6e+01	-	-	2.7e-03
Soils	7-36	1.5e+00	3.3e+01	-	1.2e-03	4.4e-02	-
Population Total*			3.8e+02			1.4e-01	
On-Site Resident- Soils All depths Kapica-Pazmey							
Groundwater, Lower Aquifer	7-30	9.3e-01	3.1e-02	3.5e-01	3.5e-04	2.1e-06	3.9e-05
Groundwater, Upper Aquifer	7-31	2.0e+02	2.0e+01	1.1e+02	6.0e-02	9.7e-03	1.7e-02
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	8.7e-02	-	3.5e-06	2.2e-04	
Ambient Air, VOC	7-32	-	-	1.6e+01	-	-	2.7e-03
Soils	7-37	1.6e+00	3.4e+01	-	4.1e-04	1.8e-02	-
Population Total*			3.8e+02			1.1e-01	

(Continued)

Population/Exposure Pathway	Table Number	Hazard Indices: Ingestion	Hazard Indices: Dermal Absorption	Hazard Indices: Inhalation	Cancer Risks: Ingestion	Cancer Risks: Dermal Absorption	Cancer Risks: Inhalation
Multi-Population Assessment (1)							
Off-Site Resident - Adult & Off-Site Resident - Child							
Off-Site Resident Adult							
Groundwater, Lower Aquifer	7-19	8.1e-01	2.7e-02	3.5e-01	2.6e-04	1.6e-06	2.7e-05
Ambient Air, VOC	7-20	-	-	9.3e-01	-	-	1.6e-04
Ambient Air, Dust	7-21	-	-	3.4e-04	-	-	5.2e-09
Off-Site Resident-Child							
Groundwater, Upper Aquifer	7-22	3.2e+00	1.5e+02	-	2.8e-04	1.7e-02	
Population Total			1.6e+02			1.7e-02	
Off-Site Resident - Adult & Trespasser - Child (2)							
Off-Site Resident-Adult							
Groundwater, Lower Aquifer	7-19	8.1e-01	2.7e-02	3.5e-01	2.6e-04	1.6e-06	2.7e-05
Ambient Air, VOC	7-20	-	-	9.3e-01	-	-	1.6e-04
Ambient Air, Dust	7-21	-	-	3.4e-04	-	-	5.2e-09
Trespasser-Child							
Surface Soils, Kapica - Pazmey	7-23	3.7e-01	1.2e+01	-	9.3e-05	5.5e-03	-
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	3.7e-02	-	3.5e-06	2.1e-04	
Ambient Air, VOC	7-26	-	-	5.3e+00	-	-	2.9e-04
Ambient Air, Dust	7-27	-	-	3.9e-04	-	-	2.0e-09
Population Total			2.1e+01			6.7e-03	

(Continued)

Population/Exposure Pathway	Table Number	Hazard Indices			Cancer Risks		
		Ingestion	Dermal Absorption	Inhalation	Ingestion	Dermal Absorption	Inhalation
Off-Site Resident - Adult & Off-Site Resident - Child & Trespasser - Child (2)							
Off-Site Resident Adult							
Groundwater, Lower Aquifer	7-19	8.1e-01	2.7e-02	3.5e-01	2.6e-04	1.6e-06	2.7e-05
Ambient Air, VOC	7-20	-	-	9.3e-01	-	-	1.6e-04
Ambient Air, Dust	7-21	-	-	3.4e-04	-	-	5.2e-09
Off-Site Resident-Child							
Groundwater, Upper Aquifer	7-22	3.2e+00	1.5e+02	-	2.8e-04	1.7e-02	-
Trespasser-Child							
Surface Soils, Kapica - Pazmey	7-23	3.7e-01	1.2e+01	-	9.3e-05	3.5e-03	-
Surface Water	7-24	6.4e-03	1.2e+00	-	1.9e-06	1.6e-04	-
Sediment	7-25	6.7e-04	8.7e-02	-	3.5e-06	2.1e-04	
Ambient Air, VOC	7-26	-	-	5.3e+00	-	-	2.9e-04
Ambient Air, Dust	7-27	-	-	3.9e-04	-	-	2.0e-09
Population Total			1.7e+02			2.4e-02	
Off-Site Resident - Adult & ACS Worker (3)							
Off-Site Resident-Adult							
Groundwater, Lower Aquifer	7-19	8.1e-01	2.7e-02	3.5e-01	2.6e-04	1.6e-06	2.7e-05
Ambient Air, VOC	7-20	-	-	9.3e-01	-	-	1.6e-04
Ambient Air, Dust	7-21	-	-	3.4e-04	-	-	5.2e-09
ACS Worker							
Ambient Air, VOC	7-28	-	-	9.9e+00	-	-	1.6e-03
Ambient Air, Dust	7-29	-	-	7.4e-04	-		1.1e-08
Population Total			1.2e+01			2.1e-03	

(Continued)

(*) Total population hazard indices and cancer risks for future Site residents were calculated by incorporating values for groundwater in the upper aquifer.

(1) In addition to the current use exposures that exist for each population as described above, it is possible that a trespasser may also be an off-Site resident, and on-Site workers may be an off-Site resident. Thus, while pathways have been combined for each individual population, populations have also been combined, as appropriate (e.g., off-Site resident and trespasser) to evaluate the maximum exposure of a population through current land use conditions that is reasonably expected to occur at the Site.

(2) The amount of exposure time to contaminants in air as a trespasser (3 hours/day, 52 days/year, 10 years) is 1.2% of the off-Site resident (24 hours/day, 182 days/year, 30 years). Because making this adjustment does not significantly alter the total multi-population risk, individual population risks were directly added in order to evaluate maximally exposed population risks.

(3) Similarly, ACS exposure to contaminants in air while working on-Site (8 hours/day, 130 days/year, 3 years) is 23.8% of the exposure conditions assumed for the off-Site resident (24 hours/day, 182 days/year, 30 years). This difference does not have a substantial impact on the total multi-population risk. Individual population risks were directly added in order to evaluate maximally exposed population risks.

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Environmental Risks

The ecological assessment for the ACS site identified two types of ecological habitat; upland and wetland. Based on the semi-quantitative, screening-level analysis of ecological risks, upland, wetland and aquatic receptors may be adversely affected by contaminants present in the environmental media within the ACS watershed. The contaminants posing the greatest potential risk are PCBs and lead. Further study will be necessary to assess the need for remedial action in the wetlands.

The U.S. Fish and Wildlife Service report suggested that the area around Griffith, Indiana, may provide habitat for several Federal or State endangered or threatened species. The King Rail, a state threatened species, was observed by the U.S. F&W during a site visit. Other endangered or threatened species are suspected on the site based on observations of available habitat made by the U.S F&W.

The results of the BlRA show that actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VII. DESCRIPTION OF ALTERNATIVES

Based on the findings of the Remedial Investigation, the following remedial action goals were developed for the ACS site:

* To ensure that public health and the environment are not exposed to cancer and non-cancer risks greater than the acceptable risk range from drinking water, soils, buried drums/liquid wastes/sludges, or other substances from the ACS site;

* to restore ground water to applicable state and federal standards;

* to reduce the migration of contaminants off site through water, soils or other media; and

* to reduce the potential for erosion and possible migration of contaminants via site surface water and sediments, including areas surrounding Turkey Creek.

Remedial action alternatives to meet these goals were developed in the Feasibility Study and are summarized below:

Alternative 1: No Action

CERCLA requires that a "No Action" alternative be considered, against which all other alternatives are compared. Under this alternative, no remedial action would take place and the site would remain in its present condition. All contamination would remain in the source areas, ground water and soils, with continued potential for entering water supplies. The Griffith Municipal Landfill would continue to operate and would eventually close under State law. Every five years a review would be performed to evaluate the site's threat to public health and the environment.

Total cost of Alternative 1: $ 0
Time to complete: 0
Quantity of waste treated: 0
Quantity of soil treated: 0

Alternative 2: Containment with slurry wall; on-site ground-water gradient control; ground-water pumping and treatment outside slurry wall; and covering contaminated surface soils.

Alternative 2 provides for the construction of a slurry wall around the entire site to minimize off-site contaminant migration and impede ground water flow into the site. The soil/bentonite slurry wall would be keyed into a clay confining layer (approximately 25 feet below the surface). Inward ground water gradients would be maintained by pumping from within the slurry wall. Ground water pumping and treatment would be performed outside the slurry wall to prevent off-site migration. Treated ground water would be discharged or reinjected to the wetlands to prevent dewatering. Contaminant source areas would be covered with a RCRA cap. Operational areas of the ACS facility could be covered with asphalt or concrete.

Total cost of Alternative 2: $ 12,000,000

Total time to complete construction: 1 year
Operation and maintenance period: 30 years
Quantity of waste treated: 0
Quantity of contaminated soil treated: 0

Alternative 3: Site dewatering; Excavation and (a) on-site incineration of buried waste or (b) on-site low temperature thermal treatment of buried waste.

Alternative 3 provides for site dewatering using a series of ground water pumping wells to allow excavation of buried waste. Excavated waste would be treated on-site by incineration (3a) or with a low temperature thermal treatment unit (3b). Treatment residuals would be placed back into the excavation. An infiltration basin would be constructed over each source area in order to use treated ground water to flush contaminants.

Total cost of Alternative 3a: $ 54,800,000
Total cost of Alternative 3b: $ 45,100,000
Total time to complete source treatment: 3 years
Quantity of waste treated: 35,000 - 65,000 cubic yards
Quantity of contaminated soil treated: 0

Alternative 4: In-situ steam stripping of buried waste, soils, and ground water.

Alternative 4 would simultaneously treat buried wastes, soil and on-site ground water in place. In-situ steam stripping consists of injecting steam at approximately 400 degrees fahrenheit through specially designed hollow stem augers which are moved vertically through the unsaturated and saturated zones. PCB-contaminated surficial soils would either be treated in-situ or excavated for off-site landfilling.

Cost of Alternative 4: $ 50,900,000
Total time to complete treatment: 10-20 years
Quantity of waste and soil treated: 135,000 cubic yards

Alternative 5: Site dewatering; Offsite incineration of intact buried drums in the On-site Containment Area; Off-site disposal of miscellaneous debris; In-situ vapor extraction of buried waste and soils.

Alternative 5 provides for site dewatering using a series of ground water pumping wells to allow for excavation of intact drums and miscellaneous debris. Intact buried drums in the On-site Containment Area would be incinerated off-site while miscellaneous debris would be landfilled off-site. PCB-contaminated surficial soils would either be treated in-situ or excavated for off-site landfilling. An in-situ vapor extraction (ISVE) system (possibly four separate systems) would then be

installed to treat both soils and buried wastes. A cover would be placed over unpaved surfaces in the areas that require ISVE to prevent short-circuiting of air from the surface and to reduce rainwater infiltration. A pilot scale test would need to be conducted to demonstrate the overall effectiveness of ISVE on materials with such high contaminant levels.

Cost of Alternative 5: $33,000,000
Total time to complete treatment: 5 - 20 years
Quantity of waste and soil treated: 135,000 cubic yards

Alternative 6: Site dewatering; (a) on-site or (b) off-site Incineration of buried drums; offsite disposal of miscellaneous debris; (a) on-site incineration of waste or (b) on-site low temperature thermal treatment of waste; in-situ vapor extraction of soils.

Alternative 6 provides for site dewatering using a series of ground water pumping wells to allow for excavation of intact drums and miscellaneous debris. Intact drums would be incinerated on-site (6a) or off-site (6b) while miscellaneous debris would be landfilled off-site. Areas designated as buried waste or PCB-contaminated soils would either be incinerated on-site (6a) or treated with low temperature thermal treatment (6b). Treatment residuals would be deposited back into the excavations. An in-situ vapor extraction (ISVE) system (possibly four separate systems) would then be installed to treat contaminated soils. Partial installation of a ISVE system could begin following the completion of site dewatering in areas which are not impacted by buried waste excavation activities. A cover would be placed over unpaved surfaces in the areas that require ISVE to prevent short-circuiting of air from the surface and to reduce rainwater infiltration. A pilot scale test would need to be conducted to demonstrate the overall effectiveness of ISVE on materials with such high contaminant levels.

Cost of Alternative 6a: $ 43,100,000 - $ 56,600,000
Cost of Alternative 6b: $ 37,800,000 - $ 46,800,000
Time to complete treatment: 6 - 8 years
Quantity of waste treated: 35,000 - 65,000 cubic yards
Quantity of soil treated: 70,000 - 100,000 cubic yards

Alternative 7: Site dewatering; (a) on-site or (b) off-site Incineration of buried drums; off-site disposal of miscellaneous debris; (a) onsite incineration of buried wastes and soils or (b) onsite low

temperature thermal treatment of buried wastes and soils.

Alternative 7 provides for site dewatering using a series of ground water pumping wells to allow for excavation of intact drums and miscellaneous debris. Intact drums will either be incinerated on-site (7a) or off-site (7b). Miscellaneous debris will be taken off-site for landfilling. Buried waste and contaminated soils will be incinerated on-site (7a) or treated on-site through low temperature thermal treatment (7b). Treatment residuals would be deposited back into the excavations.

Cost of Alternative 7a: $84,600,000
Cost of Alternative 7b: $64,400,000
Time to complete treatment: 2 - 6 years
Quantity of waste and soils treated: 135,000 cubic yards

Alternative 8: Site dewatering; Off-site incineration of buried drums; off-site disposal of miscellaneous debris; (a) landfarming of buried waste and soils or (b) slurry-phase bioreactor treatment of buried waste and soils.

Alternative 8 provides for site dewatering using a series of ground water pumping wells to allow for excavation of buried wastes, contaminated soils, intact drums and miscellaneous debris. Intact drums will be incinerated off-site. Miscellaneous debris will be taken off-site for landfilling. Buried waste and contaminated soils will be treated on-site through biological treatment. Biological treatment would be accomplished by land-farming (8a) or by slurry-phase bioreactors (8b). Treated soils would be deposited back into excavations. Because it is not known if biological treatment would attain appropriate treatment levels, a pilot study would be necessary to evaluate the technology on this contaminant matrix.

Cost of Alternative 8a: $ 34,200,000
Cost of Alternative 8b: $ 43,200,000
Time to Complete treatment: 8 - 15 years (8a)
5 years (8b)
Quantity of waste and soils treated: 135,000 cubic yards

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP requires that alternatives be evaluated on the basis of nine criteria: overall protection of human health and the environment; compliance with applicable, or relevant and appropriate, requirements (ARARs); long-term effectiveness and

permanence; reduction of toxicity, mobility, and volume (TMV) through treatment; short-term effectiveness; implementability; cost; state acceptance; and community acceptance. This section compares alternatives with respect to these criteria.

COMPARATIVE ANALYSIS OF ALTERNATIVES ACCORDING TO THE NINE EVALUATION CRITERIA

The remedial action alternatives considered for the ACS site were evaluated in accordance with the nine evaluation criteria. An analysis summary of the alternatives compared to the criteria is provided below.

THRESHOLD CRITERIA

Overall Protection

Alternative 1 does not provide any protection against contaminant exposure through buried waste, soil or ground water contact or possible exposure of emissions from buried wastes and would not prevent future site users from being exposed to unearthed soils or buried wastes resulting from future development of the site. It is therefore eliminated from further analysis.

Buried waste materials are addressed in Alternatives 2 through 8. Alternatives 3, 6, 7 and 8 provide the most protection from buried wastes because the wastes would be excavated and treated. Residual contamination would be left in the ground after treatment under Alternatives 2, 4 and 5. If buried wastes were disturbed under a future use scenario, the risks would be greater for Alternative 2, than Alternatives 4 and 5.

Contaminated soils are addressed in Alternatives 2 through 8. Alternative 7 would provide the most protection from contaminated soils through thermal treatment. Alternative 8 treats contaminated soils biologically and affords a slightly lower degree of protection due to the uncertainty of the technology to adequately handle ACS's contaminant matrix. Residual contaminants would remain in soils in Alternatives 2 through 6. Alternatives 2 and 3 are the least protective, providing natural flushing as the only soil treatment.

Alternatives 4 through 8 provide the most protection for contaminated ground water by applying pumping and treatment of the upper and lower aquifers. Alternatives 2 and 3 provide reduced protection through containment and natural flushing of on-site ground water.

Compliance with ARARs

All alternatives should comply with ARARs. However, the RCRA cap ARAR outlined in alternative 2 also applies to alternatives 3, 6, 7, and 8 if treatment residuals do not meet health-based levels. U.S. EPA has determined that LDR treatability variance levels are not protective because of the high contaminant levels known to exist. Because U.S. EPA has determined that LDR treatability variance levels are not protective for this site, and treatment to health-based levels is necessary, a RCRA cap will not be required for treatment residuals. Alternatives that include excavation and treatment (3, 6, 7, and 8) will require treatability testing to ensure that all RCRA standards are met. Another criterion to be considered is the TSCA cleanup policy for PCB spills. This policy requires that spills resulting in PCB contamination of greater than 50 ppm be cleaned up to a level of 10 ppm and covered with at least 10 inches of clean soil.

PRIMARY BALANCING CRITERIA

Implementability

Alternative 2, requiring containment only, would be easiest to implement. Alternatives 3, 6, and 7 involve proven technologies and have been effective for a wide range of contaminated matrices. Alternatives 5 and 8 have yet to be demonstrated effective on a contaminant matrix or scale analogous to the ACS site. Alternative 4 technology has not been demonstrated on full scale soil and waste cleanups and no known vendor is available.

Short-term Effectiveness

Alternatives 2 through 8 require ground water pumping and treatment and would be equally effective in addressing off-site short-term risk from ground water. Alternatives 2 and 3 would be less effective in addressing on-site ground water contamination. Alternatives which require excavation of wastes and soils (7 and 8) produce potential short-term exposure of contaminants to site workers and nearby residents. Personal protective equipment for remedial workers and VOC emission control addresses this concern for remedial workers, ACS workers and nearby residents. Alternatives which involve excavation of buried waste only and in-situ treatment of contaminated soils (3 and 6) would produce much shorter exposure to site workers and nearby residents and would also remove the majority of site contamination in a relatively short timeframe. Alternatives 4 and 5 attempt to treat buried wastes and contaminated soils in-situ. This would involve a minimum of short-term exposure but unknown effectiveness due to possible buried drums and relatively long timeframes to complete.

Long-term Effectiveness

Alternatives 2 through 8 require ground water pumping and treatment and would be equally effective in truncating continued migration of contaminants in ground water and potential exposure to offsite ground water users. Alternatives 2 and 3 would be less effective in addressing on-site ground water contamination. The buried waste at the site currently does pose an unacceptable risk to public health. There is more uncertainty with Alternative 2 than others in alleviating this risk because its effectiveness is dependent upon the cover material and the slurry wall performing adequately over the long-term. Alternatives which require removal and treatment of wastes (3, 6, 7, and 8) will result in much lower residual contamination and fewer long term maintenance problems. The effectiveness in significantly removing contaminants from wastes through Alternatives 4 and 5 is suspect. Residual contaminants in waste would definitely remain in the ground after treatment in Alternatives 2, 4, and 5.

Alternative 2 provides the same relative level of protection for contaminated soils as is discussed above for buried wastes. Alternative 3 provides only for natural flushing of contaminants from soils. Alternatives 4, 5, 6, 7, and 8 provide for treatment of contaminated soils. Alternatives 5 and 6 use the same technology and would therefore be equally effective. The relative effectiveness of Alternatives 4 and 8 is unknown. Alternative 7 would be the most effective in removing risk from contaminated soils.

Reduction of Toxicity, Mobility and Volume

Both the toxicity, mobility and volume of off-site ground water contaminants would be equally reduced in Alternatives 2 through 8. Alternatives 2 and 3 would be less effective than Alternatives 4 through 8 in reducing on-site ground water contaminant toxicity.

Alternative 2 provides only for containment and flushing of buried waste so this alternative would not significantly reduce the toxicity or volume but is designed to reduce contaminant mobility. The toxicity and volume of contaminants in wastes are reduced in Alternatives 3 through 8. The greatest probable reduction in volume and toxicity would occur with Alternatives 3, 6, and 7. The degree of volume and toxicity reduction in Alternatives 4, 5, and 8 would have to be determined with bench and pilot scale testing. It should be noted that none of the alternatives reduce the volume or toxicity of heavy metals in the waste.

Alternatives 2 and 3 provide only for flushing of contaminated soils and therefore would probably retain the highest residual

soil contamination. The effectiveness of Alternative 4 through 8 in reducing contaminant volume, toxicity and mobility on contaminated soils would have to be determined through bench and pilot scale testing. Alternatives 5 and 6 are identical in treatment technology for contaminated soils. Alternative 7 would probably afford the greatest effectiveness.

Cost

Alternatives are evaluated for the costs of capital (construction), operation and maintenance, and present-worth. Cost estimates are presented at the end of each alternative discussed in Section VII.

MODIFYING CRITERIA

State Acceptance

IDEM has been involved throughout the remedial process for ACS and has concurred with the selected remedy (as discussed below).

Community Acceptance

Community acceptance of the selected remedy is discussed in the Responsiveness Summary, which is attached as Appendix B.

IX. THE SELECTED REMEDY

Based on the information collected and developed in the RI/FS and using the comparative analysis of alternatives described above, USEPA has selected Alternative 6b as the most appropriate remedial action at the ACS site. This section contains a detailed description of the selected alternative. A flow chart outlining the basic elements is shown in Figs. 5 and 6.

A note of explanation is necessary to avoid confusion regarding the terminology of site features. The ACS site boundary is defined in Section 1. Within the site boundary individual areas referred to as the On-site Area, the On-site Containment Area, the Off-site Area, and the Off-site Containment Area exist. References made to sending material "off-site" actually mean physically transporting material off-site of the ACS Superfund Site. Likewise, treating "on-site" means physically on the ACS Superfund site and has nothing to do with the above identified site areas.

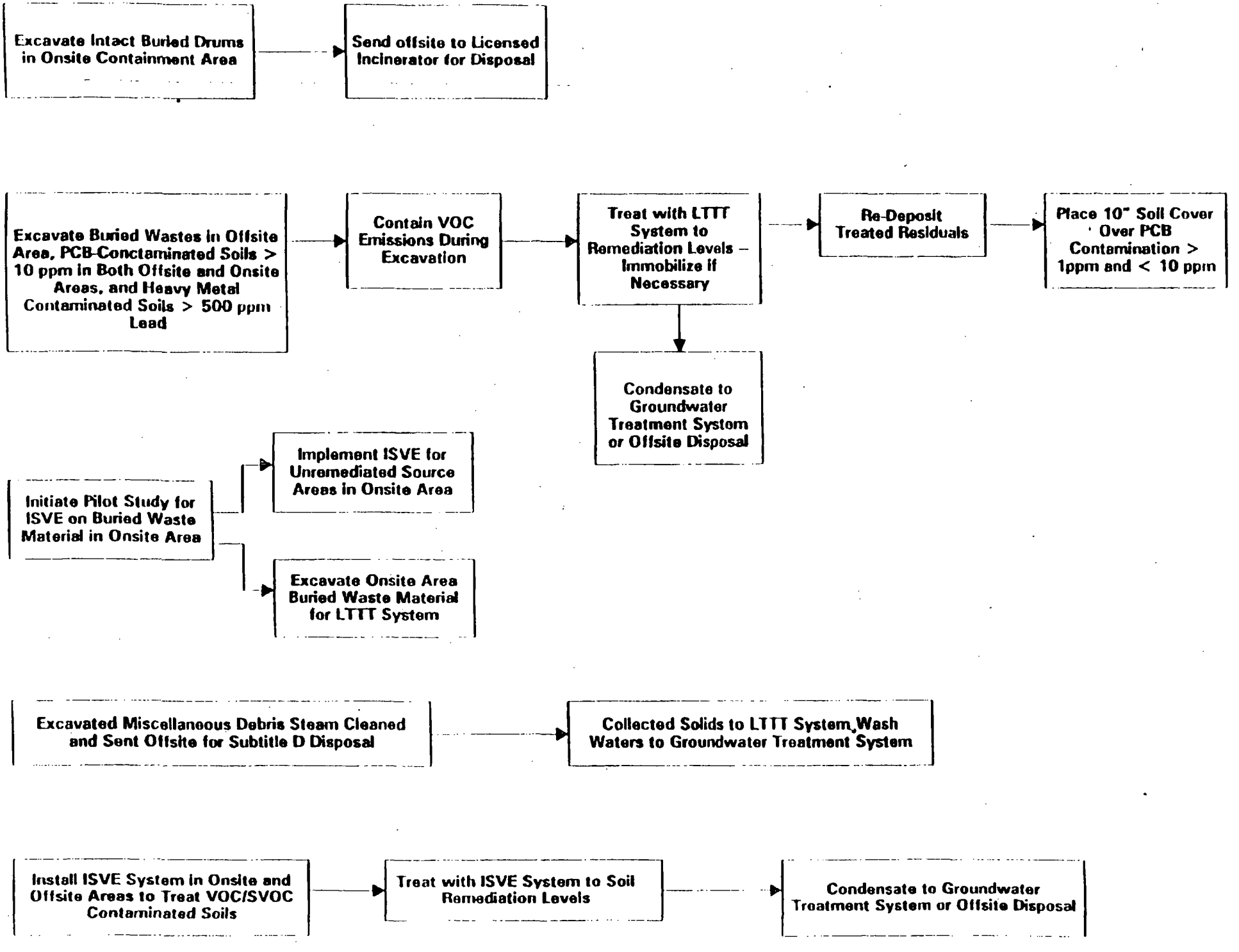
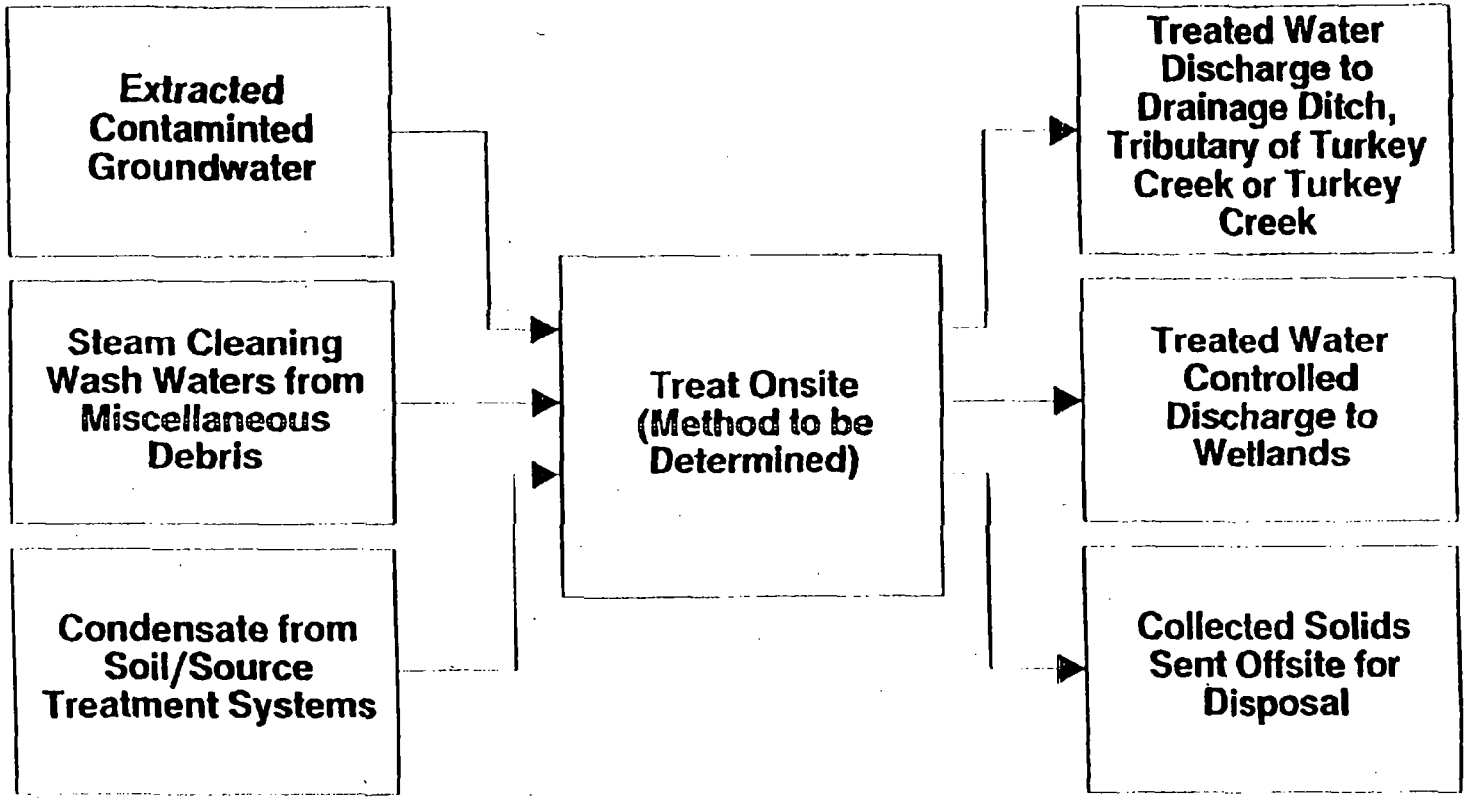

Excavate Intact Buried Drums in Onsite Containment Area
Send offsite to Licensed Incinerator for Disposal
Excavate Buried Wastes in Offsite Area, PCB-Conctaminated Soils > 10 ppm in Both Offsite and Onsite Areas, and Heavy Metal Contaminated Soils > 500 ppm Lead
Contain VOC Emissions During Excavation
Treat with LTTT System to Remediation Levels – Immobilize if Necessary
Re-Deposit Treated Residuals
Place 10" Soil Cover Over PCB Contamination > 1ppm and < 10 ppm
Condensate to Groundwater Treatment System or Offsite Disposal
Initiate Pilot Study for ISVE on Buried Waste Material in Onsite Area
Implement ISVE for Unremediated Source Areas in Onsite Area
Excavate Onsite Area Buried Waste Material for LTTT System
Excavated Miscellaneous Debris Steam Cleaned and Sent Offsite for Subtitle D Disposal
Collected Solids to LTTT System, Wash Waters to Groundwater Treatment System
Install ISVE System in Onsite and Offsite Areas to Treat VOC/SVOC Contaminated Soils
Treat with ISVE System to Soil Remediation Levels
Condensate to Groundwater Treatment System or Offsite Disposal

Fig. 6: **GROUNDWATER**



ALTERNATIVE 6B PREFERRED REMEDY:

SITE WIDE: off-site incineration of intact buried drums; off-site disposal of miscellaneous debris; in-situ vapor extraction pilot study for contaminated soils.

ON-SITE AREA: in-situ vapor extraction of contaminated soils; in-situ vapor extraction pilot project for selected buried wastes.

OFF-SITE AREA: in-situ vapor extraction of contaminated soils; on-site low temperature thermal treatment of buried wastes (with vapor emission control during excavation and possible immobilization after treatment); treatment residuals required to meet health-based levels prior to redepositing back into excavations;

GROUND WATER: ground water pumping and treatment; treated water controlled discharge to wetlands; continued evaluation and monitoring of wetlands and, if necessary, remediation, which may require replacement of wetlands.

Ground water

Under the Selected Alternative 6b, a ground water pump and treat system will be installed in the upper and lower ground water aquifers to dewater the site, to contain contaminated ground water within the point of compliance and to ensure that MCLs, a cumulative cancer risk of 1.3 x 10-5 and a cumulative noncancer risk of HI < 1 are attained outside and downgradient of the point of compliance.

The method of ground water treatment to be used will be determined during the design of the system. It is expected that ground water treatment will include technologies involving air stripping, UV/Oxidation, chemical precipitation, and carbon absorption. Permitting the choice to be made during design will provide for the selection of the most appropriate system for the task to be performed by allowing for additional information to be used in the decision. The selection will be made using good engineering practice. The ground water treatment extraction system will meet NPDES substantive requirements and will utilize the best available control technology for treatment and discharge of the treated ground water to surface water or wetlands. U.S. EPA's OSWER Directive 9355.0-28, relating to the control of air emissions at Superfund ground water sites will also be considered in the ground water treatment process selection.

The following discharge options exist for the remaining quantity of treated ground water: discharge to the drainage ditch running through the western wetlands; discharge directly to Turkey Creek or a tributary; and reinjection. The discharge option to the

Hammond POTW, as identified in the proposed plan, has been eliminated because of Hammond's poor compliance history. This option could be reconsidered if Hammond came into compliance. Reinjection of treated ground water after buried waste excavation and ISVE are complete may be considered because nutrient addition to treated ground water could promote bioremediation of any residual SVOC contaminants remaining in the subsurface. Ground water will be discharged in accordance with appropriate NPDES discharge limits, or in the case of controlled discharge to wetlands, Ambient Water Quality Criteria. A portion of the treated ground water will be discharged to the western wetlands in a controlled fashion to prevent wetland dewatering and degradation. Continued wetland evaluation is required based on the conclusions of the USEPA-produced ecological assessment. Wetland remediation will be implemented as part of this remedy, if necessary, to avoid the long and short term adverse impacts associated with the destruction or modification of wetlands.

Ground water remediation levels are provided in Table 7. The point of compliance for ground water remediation levels is the down-gradient site boundary. The site boundary was selected as the point of compliance because site contamination was not found to be limited to discrete, well-defined units. Remediation levels must also be attained outside the site boundary, to the extent of ground water contamination. The intent of the remediation levels outlined in Table 7 is to present a guide to manage risk within the cumulative 10-4 - 10-6 carcinogenic risk range and cumulative noncancer hazard index (HI) of < 1.0.

The ground water will be treated to meet MCLs, to achieve a cumulative cancer risk of 1.3 x 10-5 for carcinogenic contaminants and to achieve a cumulative noncancer risk of HI < 1. Due to the existence of multiple contaminants, clean up of the ground water to MCLs alone would exceed a cancer risk of 1 x 10-4 and thus would not be protective of human health and the environment. Thus the ground water remediation levels for carcinogenic contaminants represent levels that have a carcinogenic risk of 1 x 10-6 or MCLs less than 10-6 risk.

For noncancer contaminants, these remediation levels represent a noncancer risk of HQ =1 for individual contaminants (or MCLs less than 10-6 risk). Based on the number of carcinogenic contaminants, the cumulative risk that must be attained is therefore 1.3 x 10-5 for carcinogenic contaminants.

The actual remediation level will depend on how many noncancer contaminants are detected in compliance monitoring wells and must represent a cumulative HI < 1.0.

Technology limitations and detection limits may affect the attainment of these levels for individual contaminants, however,

TABLE 7: GROUND WATER

Final Remediation Levels			Corresponding Risk	
Chemical	Remediation Level ug/L	Basis	Cancer	NonCancer
Benzene	5.0	MCL	6.5E-07	NA
Vinyl Chloride	0.25	Risk	1.0E-06	NA
PCBs	0.06	Risk	1.0E-06	NA
bis(2-Chloro-ethyl)ether	21.0	Risk	1.0E-06	NA
Arsenic	8.8	Risk	1.0E-06	<.01
PCE	5.0	MCL	6.2E-07	NA
Methylene Chloride	5.0	MCL	5.4E-07	NA
Chloromethane	8.4	Risk	1.0E-06	NA
Beryllium	0.02	Risk	1.0E-06	NA
Trichloroethene	5.0	MCL	2.1E-07	NA
bis(2-Ethylhexyl) phthalate	5.8	Risk	1.0E-06	NA
Cyclic Ketones	5.8	Risk	1.0E-06	NA
Pentachlorophenol	1.0	MCL	1.5E-06	NA
1,4-Dichlorobenzene	3.3	Risk	1.0E-06	NA
Isophorone	19	Risk	1.0E-06	NA
2-Butanone	24,000 - 2,000	HI	NA	1.0-0.08
4-Methyl-2-pentanone	640 - 53	HI	NA	1.0-0.08
Non-Cyclic Acids	280 - 23	HI	NA	1.0-0.08
Acetone	2,300 - 192	HI	NA	1.0-0.08
Branched Alkanes	210 - 18	HI	NA	1.0-0.08

Ethylbenzene	390 - 33	HI	NA	1.0-0.08
Thallium	2.4 - 0.2	HI	NA	1.0-0.08
Dimethyl Ethyl Benzenes	250 - 21	HI	NA	1.0-0.08
1,2-Dichloroethene (cis)	330 - 28	HI	NA	1.0-0.08
Manganese	3,300 - 275	HI	NA	1.0-0.08
4-Methylphenol	1,700 - 142	HI	NA	1.0-0.08
1,1-Dichloroethane	2,200 - 183	HI	NA	1.0-0.08

the cumulative risk must meet 1.3 x 10-5 cumulative cancer risk and a cumulative HI < 1.0 total noncancer risk.

During the 30 or more years of aquifer remediation, the ground water pump and treat system will be monitored and adjusted, as necessary, by the performance data collected during operation. Adjustments to the system may include a more aggressive pump and treat approach including; nutrient introduction to promote bioremediation, alternating pumping at wells to eliminate stagnation points, and pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into ground water.

Source Areas and Contaminated Soils - Cleanup Levels

Under the selected alternative, all buried waste and soil will be treated to a cumulative carcinogenic risk of 3.3 x 10-5, and a cumulative noncancer risk of HI < 1. For carcinogenic contaminants, these remediation levels represent carcinogenic risk of 1 x 10-6 for individual contaminants. Based on the number of carcinogenic contaminants, the cumulative risk that must be attained is therefore 3.3 x 10-5 for carcinogenic contaminants.

For noncancer contaminants, these remediation levels represent a noncancer risk of HQ = 1 for individual contaminants. The range given for individual noncancer contaminants is based on the number of noncancer contaminants detected in site soils. The actual remediation level will depend on how many noncancer contaminants are detected in the particular remediation area and must represent a cumulative HI < 1.0.

Technology limitations and detection limits may affect the attainment of these levels for individual contaminants, however, the cumulative risk must meet 3.3 x 10-5 cumulative cancer risk and a cumulative HI < 1.0 total noncancer risk.

The cleanup level of 500 ppm lead for contaminated soils is based on the Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER Directive 9355.4-02). This guidance sets a clean-up range of 500-1000ppm lead. The most conservative value was chosen due to the large number and high levels of other site contaminants. This clean-up level for lead may need further evaluation and refinement through the use of the U.S. EPA Uptake Biokinetic (UBK) Model.

The cleanup level of 10 ppm PCBs with 10" soil cover is based on TSCA policy for unrestricted access. U.S. EPA guidance suggests a concentration of 1 ppm for PCB cleanup based on the standard exposure assumptions under the residential use scenario. A ten inch soil cover has been estimated to give an additional order of magnitude protection. Therefore, a cleanup level of 10 ppm with

10" of clean soil cover would provide protection at the 10-5 level. Soil and waste exceeding 10 ppm will be treated to 2 ppm PCBs in order to achieve a clean up level equivalent to incineration. If treatment of soil and waste cannot achieve 2 ppm, the soil and waste will be sent offsite in compliance with TSCA.

Compliance with the Land Disposal Restrictions may be achieved through a Soil and Treatability Variance pursuant to 40 CFR 268.44. Such a variance will result in the establishment of treatment levels/ranges for the contaminated soil at the site. However, because of the high site contaminant levels U.S. EPA has determined that the treatment level ranges established through a treatibility variance are not protective of human health and the environment. Residuals from the LTTT process must meet remediation levels identified for contaminated soils set in Table 8 in order to be redeposited onsite. Because clean-up levels are presented as ranges for noncarcinogenic contaminants and flexibility exists with respect to clean-up levels for individual carcinogenic contaminants, LDR treatability variance levels cannot be exceeded for any individual contaminant. Residuals will also be immobilized, if necessary, to attain these standards and RCRA hazardous waste characteristic levels.

Source Areas

Under the selected alternative, intact buried drums in the On-Site Area will be excavated for off-site incineration. The following soils and waste will be excavated and treated by low temperature thermal treatment (LTTT) to meet clean up levels: 1) buried wastes in the Off-site Area; 2) soils contaminated with PCBs at a level greater than 10 ppm in both the On-site and Off-site Areas; and 3) isolated VOC-contaminated soil not within the areas to be addressed by In-situ Soil Vapor Extraction (ISVE). All LTTT residuals will be deposited back into the excavations after meeting appropriate health-based remediation levels identified in Table 8. LTTT treatment residuals can contain up to 2 ppm PCBs, however, in order to be used as cover material treatment residuals must not contain more than 1 ppm total PCBs. PCB treatment criteria cannot be met through dilution of material to be treated. Treatability studies will need to be conducted to determine if LTTT can treat to 2 ppm total PCBs. If the technology fails to meet this cleanup objective then PCB contaminated soils greater than 10 ppm must be sent offsite to a licensed TSCA landfill or incinerator.

Isolated pockets of heavy metal-contaminated soils greater than 500 ppm lead in both the On-Site and Off-Site Areas will also be excavated, treated by LTTT to remove VOCs and SVOCs, possibly immobilized to remove the hazardous waste characteristic for metals, and sent off-site for disposal. Vapor emissions will be contained during excavation and ambient air monitoring will be

TABLE 8: SOIL

Final Remediation Levels			Corresponding Risk	
Chemical	Remediation Level mg/kg	Basis	Cancer	NonCancer
CPAHs	0.0026	Risk	1.0E-06	NA
Tetrachloroethene	1.1	Risk	1.0E-06	NA
bis(2-Ethylhexyl) phthalate	1.1	Risk	1.0E-06	NA
Aldrin	0.002	Risk	1.0E-06	NA
Tricholorethene	5.3	Risk	1.0E-06	NA
Isophorone	7.2	Risk	1.0E-06	NA
Styrene	1.7	Risk	1.0E-06	NA
Pentachlorophenol	0.43	Risk	1.0E-06	NA
Benzene	1.0	Risk	1.0E-06	NA
4,4'-DDD	0.12	Risk	1.0E-06	NA
2,4-Dinitrotoluene	0.044	Risk	1.0E-06	NA
1,1-Dichloroethene	0.098	Risk	1.0E-06	NA
Carbon Tetra-Chloride	0.38	Risk	1.0E-06	NA
bis(2-Chloroethyl) ether	0.027	Risk	1.0E-06	NA
4,4'DDT	0.088	Risk	1.0E-06	NA
Chloroform	9.5	Risk	1.0E-06	NA
Hexachlorobuta-diene	0.36	Risk	1.0E-06	NA
1,2-Dichloroethane	0.64	Risk	1.0E-06	NA
Methylene Chloride	6.2	Risk	1.0E-06	NA
1,2-Dichloropropane	0.42	Risk	1.0E-06	NA
Hexachlorobenzene	0.018	Risk	1.0E-06	NA
gamma-BHC (Lindane)	0.046	Risk	1.0E-06	NA

Cyclic Ketones	7.3	Risk	1.0E-06	NA
1,1,2-Trichloro-ethane	0.51	Risk	1.0E-06	NA
n-Nitrosodiphenyl-amine	12.0	Risk	1.0E-06	NA
1,1,2,2-Tetra-chloroethane	0.28	Risk	1.0E-06	NA
Vinyl Chloride	0.031	Risk	1.0E-06	NA
alpha-BHC	0.0047	Risk	1.0E-06	NA
beta-BHC	0.016	Risk	1.0E-06	NA
2,6-Dinitrotoluene	0.044	Risk	1.0E-06	NA
4,4'-DDE	0.16	Risk	1.0E-06	NA
1,4-Dichlorobenzene	2.4	Risk	1.0E-06	NA
Heptachlor Epoxide	0.0033	Risk	1.0E-06	NA
Antimony	15 - 0.5	HI	NA	1.0-0.03
Tolune	5,000 - 167	HI	NA	1.0-0.03
Cadmium	51 - 2	HI	NA	1.0-0.03
Ethylbenzene	1,300 - 43	HI	NA	1.0-0.03
Barium	2,600 - 87	HI	NA	1.0-0.03
Chromium (VI)	1,400 - 47	HI	NA	1.0-0.03
Naphthalene	82 - 3	HI	NA	1.0-0.03
Nitrogenated Benzenes	6.2 - 0.2	HI	NA	1.0-0.03
n-Chain Alkanes	760 - 25	HI	NA	1.0-0.03

1,1,1-Trichloro-ethane	2,300 - 77	HI	NA	1.0-0.03
Branched Alkanes	770 - 26	HI	NA	1.0-0.03
4-Methyl-2-pentanone	630 - 21	HI	NA	1.0-0.03
Methyl Proply Benzenes	490 - 16	HI	NA	1.0-0.03
Halogentaed Alkanes	2,300 - 77	HI	NA	1.0-0.03
Endosulfan I	0.63 - 0.02	HI	NA	1.0-0.03
Dimethyl Ethyl Benzenes	1,300 - 43	HI	NA	1.0-0.03
1,2-Dichloroethene (cis)	250 - 8.3	HI	NA	1.0-0.03
2-Butanone	620 - 21	HI	NA	1.0-0.03
Non-Cyclic Acids	1,000 - 33	HI	NA	1.0-0.03
Methylated Naphthalenes	85 - 3	HI	NA	1.0-0.03
Acetone	2,400 - 80	HI	NA	1.0-0.03
Chlorobenzene	150 - 5	HI	NA	1.0-0.03
Xylenes (mixed)	26,000 - 867	HI	NA	1.0-0.03
Oxygenated Benzenes	1,200 - 40	HI	NA	1.0-0.03
Diethyl Benzenes	1,300 - 43	HI	NA	1.0-0.03

Propenyl Benzenes	320 - 11	HI	NA	1.0-0.03
Di-n-butylphthalate	2,300 - 77	HI	NA	1.0-0.03
Ethyl Methyl Benzenes	4,900 - 163	HI	NA	1.0-0.03
1,2,4-Trichloro benzene	16 - 0.5	HI	NA	1.0-0.03
Chloroethane	2700 - 90	HI	NA	1.0-0.03

required. Condensate from LTTT or ISVE processes will be properly disposed offsite.

Under the selected alternative, in order to assess whether ISVE technology will work on buried wastes with such high contaminant levels and because buried drums may interfere with the ISVE effectiveness, a pilot study may be conducted on a portion of the buried wastes in the On-site Area. The On-site Area was chosen because it was determined through the RI that buried drums were more accurately defined than in the Off-site Area. This pilot study, if conducted, will be in conjunction with the ISVE system to be developed for all contaminated site soils and will have a defined proof of performance period.

At the end of the performance period, it will be determined by USEPA if in-situ soil vapor extraction is effective on the buried waste in the On-site Area. Confirmation sampling will be required to determine if ISVE can meet health-based levels. If the U.S. EPA determines that the technology is capable of meeting remediation levels then it may be expanded to unremediated portions of the On-site Area.

The potential benefit derived from successful demonstration of ISVE's effectiveness on On-site Area buried waste would be a decrease in the overall cost of remediation and a reduction of the amount of material that would have to be handled for LTTT. If the technology doesn't provide a potential to meet remediation levels or if pilot studies are not conducted then LTTT will be implemented for all buried wastes and contaminated soils.

Even if the pilot study fails to demonstrate that ISVE can meet remediation levels for both buried wastes and contaminated soils, the potential decrease in VOCs might negate the need for elaborate VOC emission control during buried waste excavation, contaminated soil excavation, drum removal, and transportation of waste material and contaminated soil to the Off-site Area LTTT System. With U.S. EPA's approval, studies accessing ISVE's effectiveness on site contamination may be abandoned in favor of implementing LTTT for all buried wastes and contaminated soils.

Regardless of the pilot study results, LTTT will be implemented and completed for buried wastes in the Off-site Area. USEPA has determined that an in-situ technology (i.e. ISVE) is not appropriate for the Off-site Area due to the large number and random distribution of buried drums. However, additional pilot scale testing on other innovative technologies may be conducted providing such testing does not delay the current remediation schedule involving LTTT.

Miscellaneous debris uncovered during excavation activities will be steam-cleaned and sent off-site for disposal. Any intact buried drums excavated will be sent off-site for incineration.

Miscellaneous debris wash waters will be treated in the ground water treatment system or sent offsite.

Contaminated Soils

Both On-site Area and Off-site Area Soils contaminated with VOCs and SVOCs will be treated with ISVE. Remediation levels for contaminated soils are also set in Table 8.

If it is determined by USEPA that final remediation levels cannot be met by ISVE then VOC/SVOC contaminated soil will be excavated, treated by LTTT to health-based standards, and redeposited.

Implementation of an unproven technology through pilot testing on a contaminant matrix and scale found at the ACS site contaminated soils may provide valuable data for remediation of future sites. Additional pilot scale testing on other innovative technologies may be conducted providing any additional testing does not delay the current remediation schedule. Because LTTT will be implemented in the Off-site Area, no time will be lost in the overall remediation of this site.

This alternative has been supplemented by USEPA because alternative 6b, as proposed in the FS, did not address VOC emissions resulting from excavation, heavy metal-contaminated soils outside of defined source areas, and continued evaluation of the wetlands.

Air Emissions, Monitoring, and Institutional Controls

Air emissions from excavation and treatment processes will be controlled and monitored. The need for air emission controls will be triggered by exceedences in Federal or State air quality standards. These processes include excavation of intact drums and miscellaneous debris; soil excavation, consolidation, and treatment associated with the LTTT system; and ISVE treatment. Offgas treatment or other corrective actions will be utilized if excess cancer risk from off-gas chemicals is outside the 10-4 to 10-6 risk range for nearby residences or site workers.

The remedy will also include (1) long-term ground water monitoring to ensure that action levels are being met, (2) site fencing and, to the extent possible, deed restrictions to prevent use of the ground water in contaminated aquifers under the site, and (3) to the extent possible, deed notices or advisories will be provided for protection from contaminants and to inform off-site users of ground water use recommendations until cleanup levels are met.

A cost estimate for the selected remedy is provided in Table 9. This cost estimate represents the scenario where ISVE attains

Table 9

PROPOSED PLAN (THERMAL OFF SITE/ ISVE ON SITE) COST ESTIMATE

DIRECT CAPITAL COSTS

ITEM	UNIT	QUANTITY	UNIT COST	COST
Surface Water Diversion	lump sum	1		$200,000
Site Preparation	lump sum	1		$525,000
Groundwater Extraction System	wells	24		$500,000
Groundwater Treatment System	gpm	200		$1,200,000
Remove ACS Tank Farms	lump sum	1		$150,000
Excavation of Drums	drums	500		$50,000
Repackaging and Off-site Incineration of Drums	drums	500		$350,000
Off-site Disposal of Drum and Miscellaneous Debris	lump sum	1		$1,000,000
Off-site Disposal of PCB Soil Residue at RCRA/TSCA Landfill	cu yds	1,000		$700,000
Treatability/Pilot Study	lump sum	1		$200,000
Portable Building	lump sum	1		$168,000
On-site Low Temp	cu yds	18,000	300	$5,400,000
Surface Restoration or Capping	lump sum	1		$525,000
Offsite Disposal of Metals	cu yds	2,500	250	$625,000
Vapor Extraction Pilot Study	lump sum	2	200,000	$400,000
Vapor Extraction	systems	4		$800,000
Wetland Assessment	lump sum	1		—
DIRECT CAPITAL SUBTOTAL, EXCLUDING LTTT				$7,393,000
DIRECT CAPITAL SUBTOTAL FOR LTTT				$5,400,000
OVERALL DIRECT CAPITAL SUBTOTAL				$12,793,000

(CONTINUED)

INDIRECT CAPITAL COSTS

Expressed as a fraction of the direct capital subtotal (excluding LTTT):

ITEM	PERCENTAGE	COST
Health & Safety	20%	$1,479,000
Design Level Investigation	20%	$1,479,000
Engineering Design	10%	$739,000
Startup Costs	10%	$739,000
License/Permit Fees/Oversight	10%	$739,000
Scope Contingency	20%	$1,479,000
	25%	$1,848,000
	TOTAL INDIRECT CAPITAL COSTS	$8,500,000

(CONTINUED)

OPERATION & MAINTENANCE COSTS

	ANNUAL O&M	DISCOUNT RATE	NUMBER OF YEARS	PRESENT WORTH
Groundwater Monitoring	$200,000	5%	30	$3,074,000
Groundwater Extraction Wells	$65,000	5%	30	$999,000
Initial Groundwater Treatment	$250,000	5%	6	$1,269,000
Intermediate Groundwater Treatment	$250,000	5%	11	$2,077,000
Final Groundwater Treatment	$250,000	5%	30	$3,843,000
Excavation Vapor Treatment	$400,000	5%	2.5	$919,000
Vapor Extraction	$400,000	5%	7	$2,315,000
Insurance	$10,000	5%	6	$51,000
Reserve Fund	$10,000	5%	6	$51,000
Administration	$200,000	5%	30	$3,074,000
TOTAL PRESENT WORTH OF O&M				$17,670,000
DIRECT CAPITAL COST				$12,790,000
INDIRECT CAPTITAL COST				$8,500,000
TOTAL NET PRESENT WORTH				$39,000,000

remediation levels for On-site Area buried waste. If ISVE is proven ineffective on all site contaminants then costs for LTTT would increase dramatically and the overall remedial action may require costs similar to those outlined for alternative 7b (see Section VII).

Griffith Municipal Landfill

The Griffith Municipal Landfill was included in the ACS remedial investigation after the ACS site was added to the NPL. The BlRA did not identify any completed exposure pathways from the landfill. Additionally, the RI did not indicate that the landfill was causing any downgradient ground water contamination. This could be due in part to the dewatering activities at the landfill. As part of the RI, it was determined through modeling, that if the current dewatering system was discontinued the ground water flow patterns would not change significantly. Given these facts, this ROD does not require remedial action at the Griffith Municipal Landfill.

RCRA Closure

A total site closure plan was approved by IDEM on August 4, 1992, for container, tank storage, and solvent distillation units at the site. As defined in the approval letter, the closure process must be completed within 180 days and must include a certification by both the Site's Owner/Operator and an independent registered professional engineer that the facility's regulated units have been closed in accordance with the approved closure plan. Because this closure process is expected to be completed before remedial design begins, the results of this closure will be evaluated by U.S. EPA on the need to incorporate any additional contaminated areas into this final remedy.

X. DOCUMENTATION OF SIGNIFICANT CHANGES

The proposed plan, which described USEPA's preferred alternative for remediation of the ACS site was released for public comment on June 30, 1992. The public comment period ended August 28, 1992. The Agency has reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as described in the Proposed Plan, were necessary. However, a few minor changes were made to the proposed remedy, as discussed below:

- The treated ground water discharge option to the Hammond POTW has been eliminated based on Hammond's poor compliance history.

- Innovative technologies may be evaluated as part of a treatability testing program for effectiveness on buried

waste and contaminated soils. However, this evaluation will not delay the overall remediation plan outlined in this ROD.

- Treatability testing on the effectiveness of ISVE on buried waste and contaminated soils may be abandoned with U.S. EPA's approval if it is determined through further engineering analysis that ISVE will be ineffective at meeting final remediation levels.

XI. STATUTORY DETERMINATIONS

Protection of Human Health and the Environment

The Baseline Risk Assessment developed for the American Chemical Services site showed that exposure to upper aquifer ground water, buried wastes and contaminated soils pose the greatest risks associated with the site. Extraction and treatment of contaminated ground water, and imposition of use restrictions for contaminated ground water until aquifer remediation is attained will address risks from ground water.

Implementation of the remedy will protect against risks from direct contact with wastes and soils. All risks resulting from exposure to individual contaminants will be reduced to MCLs, a 1 x 10-6 carcinogenic risk level or a HI of less than one. Cumulative carcinogenic risk will be managed within the 10-4 to 10-6 risk range.

Use of emissions controls, if determined to be necessary, will protect against short term exposure to contaminants during the remedial action. The discharge of treated water to the on-site wetlands and Turkey Creek (or one of its tributaries) will be regulated by NPDES and ambient water quality criteria to ensure that the remedial action does not affect aquatic life.

Attainment of Applicable, or Relevant and Appropriate, Requirements

The selected remedial action will meet all identified applicable, or relevant and appropriate, federal and more stringent state requirements unless waived pursuant to Section 121(d)(4)(B). The ARARs for the selected remedy are described and/or listed below.

Chemical Specific

Safe Drinking Water Act

The Safe Drinking Water Act is relevant and appropriate to the Site because the aquifers underlying the Site are class II aquifers which are presently being used as a drinking water source in the area surrounding the Site. The NCP calls

for use of MCLs or MCLGs when setting standards for aquifer restoration, except in cases where the MCLG is zero, or where the attainment of MCLs would result in a cumulative carcinogenic risk outside of the 10-4 to 10-6 risk range. The selected remedy includes cleanup standards for all contaminants in the aquifers which achieve risk based standards. The standard for each contaminant equals or exceeds the MCL for that contaminant.

Clean Water Act

Surface water quality standards for the protection of human health and aquatic life were developed under section 304 of the Clean Water Act. The federal Ambient Water Quality Criteria (AWQC) are nonenforceable guidelines that set pollutant concentration limits to protect surface waters that are applicable to point source discharges, such as from industrial or municipal wastewater streams. At a Superfund site, the federal AWQC would not be applicable except for pretreatment requirements for discharge of treated water to a Publicly Owned Treatment Works (POTW). AWQCs would be relevant and appropriate to the point source discharges if the treated ground water is discharged to the drainage ditch running through wetlands, to Turkey Creek, or directly to wetlands. The substantive NPDES permitting requirements would need to be met if discharge is allowed to the Hammond POTW.

Toxic Substances Control Act

The 10 ppm clean up level for PCBs is based on the requirements for PCB spills outlined in 40 CFR 761.125(c)(4)(v) which states that soil contaminated by PCBs at 10 ppm will be excavated to a minimum depth of 10 inches. Although the PCB Spill Policy is not an ARAR, it is an important TBC. Excavated soils will be replaced with clean soils containing PCBs less than 1 ppm. U.S. EPA guidance on Remedial Actions for Superfund Sites with PCB contamination also suggests 1 ppm PCB cleanup level, providing a 10-5 excess cancer risk, under the residential use scenario. Adding a 10" soil cover provides an additional order of magnitude protection. Therefore, a 10 ppm cleanup level with a 10" soil cover will provide protection under the future residential use scenario at the 10-5 excess cancer risk level.

TSCA regulations are generally considered applicable or relevant and appropriate when PCB concentrations are greater than 50 ppm and disposal occurred after February 17, 1978. Although PCBs were originally disposed of at ACS prior to 1978, excavation and re-disposal of PCB material will occur on site as part of the planned remedial action. Thus, TSCA

regulations governing disposal are considered applicable for those portions of the remedy which involve on site disposal of material contaminated above 50 ppm.

TSCA disposal regulations at 40 CFR 761.60 allow PCB disposal of non-liquid PCBs at concentrations greater than 50 ppm through the use of treatment that provides treatment equivalent to incineration, ie. treatment to a level less than 2 ppm. This remedy requires treatment of PCB soils containing greater than 10 ppm PCBs to a level of 2 ppm. Low temperature thermal treatment is anticipated to provide treatment equivalent to incineration. If LTTT is unable to treat PCBs to 2 ppm, they will be sent to an off-site incinerator.

Clean Air Act

Clean Air Act, 42 U.S.C. 7401 et seq, provides air emission requirements for actions which may release contaminants into the air. The selected remedy involves excavation and treatment activities which may release contaminants or particulates into the air. Emission and technology requirements promulgated under this act are relevant and appropriate, including provisions of the State of Indiana Implementation Plan. Also ARARs are the Clean Air Act's National Emission Standards for Hazardous Air Pollutants (NESHAPs, 40 CFR 61).

-Indiana VOC Emission Standards (Title 326 IAC Articles 2-1 and 8-1)

-Indiana fugitive dust control (Title 326 IAC Articles 6-4 and 6-5)

-Indiana regulations on treatment of hazardous waste or PCBs in a unit (Title 329 IAC Articles 3-50-2, 3-51-2, 3-52-4, 3-54-4 through 546, 3-30-2, and 4)

Action Specific

RCRA Land Disposal Restrictions

Land disposal restrictions (LDRs) are applicable to this site since the remedy involves excavation, treatment, and placement of residuals from the treatment of RCRA listed waste. The LDRs provide for the use of LDR treatability variance levels for soil or debris contaminated with a RCRA listed waste. The selected remedy will comply with the LDRs through a treatability variance under 40 CFR 268.44. Because

of the high concentrations of contaminants at the Site, LDR treatability variance levels are not protective of human health at this site. This remedy requires that standards for each contaminant at the site must equal risk based levels and equal or exceed LDR treatability variance requirements.

-Air Emissions from On-site treatment operations (40 CFR 50.1-50.12, 61.01-61.252; 40 CFR 264 Subpart AA and BB; Title 326 IAC Articles 1-3-4, 2-1, 8;)

-RCRA Definition and Identification of Hazardous Waste (40 CFR 261)

-Indiana Hazardous Waste Rule (Title 329 IAC Article 3.1)

-Indiana Special Waste Rule (Title 329 IAC Article 2-21)

-Indiana PCB Rule (Title 329 IAC Article 4)

-RCRA Standards for Generators of Hazardous Waste (40 CFR 262 and Article 329 IAC 3.1)

-RCRA Standards for Transport of Hazardous Waste (40 CFR 263)

-RCRA Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (40 CFR 264)

-Occupational Safety and Health Act (OSHA) Regulations for Workers Involved in Hazardous Waste Operations (29 CFR 1910)

-Indiana Final Rules Concerning the Regulation of Water Well Drilling/Well Abandonment Specifications (Title 310 IAC Article 16)

Location Specific

Flood Plains

The requirements of 40 CFR 264.18(b) and Executive Order 11988, Protection of Flood Plains are relevant and appropriate to actions on the Site. To meet these ARARs, the treatment systems will be located above the 100-year flood plain and be protected from erosion damage.

Wetlands

Executive Order 11990 (Protection of Wetlands) is an applicable requirement. Wetlands will be monitored and evaluated. The selected remedy may include significant excavation affecting wetlands adjacent to the ACS facility.

ARARs regarding these wetlands include Executive Order 11990, which requires that actions at the Site be conducted in a manner minimizing the destruction, loss, or degradation of wetlands. These ARARs will be met through the continued evaluation of the wetlands, and if necessary, implementation of a plan to limit adverse impacts to the wetlands, or restore or mitigate the wetlands. Water will also be discharged into the wetlands to prevent their dewatering from ground water treatment at the site.

-Indiana regulations on activities affecting the quality of water (Title 327 IAC Articles 2-1-7, 2-1-6(f), 2-1-6(g))

-Indiana DNR (IC-13-2-6.1) registration of extraction wells

-Indiana regulations on water quality standards for direct discharge of pollutants (Title 327 IAC Articles 2-1, 2-1-6(b), 3 (construction standards), and 5)

-Fish and Wildlife Protection Act (40 CFR 6.302)

-Endangered Species Act (16 USC 1351 as amended by Public Law 98 -237)

-Wetland Protection through the State of Indiana Water Quality Surveillance Standards Branch and the Indiana DNR Division of Water Requirements

To Be Considered Criteria

-Guidance on Remedial Actions for Superfund Sites with PCB Contamination (OSWER Directive 9355.4-01)

-Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER Directive 9355.4-02)

-Guidance on Control of Air Emissions From Superfund Air Strippers at Superfund Ground Water Sites (OSWER Directive 9355.0-28)

-RCRA health-based "action levels" for individual Appendix VIII hazardous constituents. (7/27/90 FR; proposed RCRA corrective action rule)

-TSCA PCB Spill Cleanup Policy and provisions (40 CFR 761)

Cost-Effectiveness

Alternative 6b will achieve significant risk reduction at a total PNW cost of $37,800,000 to $46,800,0000. Costs could be in the

range of Alternative 7b PNW estimates of $64,400,000 if all contaminated soils are required to undergo LTTT. Alternatives involving incineration (6a and 7a) offer a somewhat higher degree of permanence but at a significantly higher cost.

The selected alternative is approximately three to four times more expensive than the least expensive action, Alternative 2, which only provides for ground water treatment and containment of site contaminants.

Other alternatives not involving incineration, are less costly than the preferred alternative but provide less treatment. Alternative 3b is less costly than the preferred alternative but does not treat contaminated soils. Alternatives 5 and potentially 4 are less costly than the preferred alternative but employ in-situ technologies on wastes that contain buried drums. U.S. EPA does not believe it is possible to verify the effectiveness of in-situ treatment on some portions of the ACS site. Alternatives 8a and 8b are less costly than the preferred alternative but have not been demonstrated to be potentially effective on a contaminant matrix or scale similar to ACS's.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

USEPA believes that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at the American Chemical Services site. Of those alternatives that are protective of human health and the environment and that comply with ARARs, USEPA has determined that the selected remedy provides the best balance of long-term effectiveness and permanence, reduction of TMV through treatment, short term effectiveness, implementability, and cost, taking into consideration the statutory preference for treatment as a principal element and State and community acceptance.

Several innovative treatment alternatives were considered for this site. USEPA has selected LTTT followed by solidification for buried waste material because it affords a higher degree of certainty of achieving the remedial action goals for all contaminants than some of the less established technologies considered, such as ISVE, in-situ steam stripping or biological treatment of the buried waste material.

Preference for Treatment as a Principal Element

The selected remedy provides for treatment of the principal threats at the site. The remedy calls for removal and offsite

incineration of intact buried drums. The remedy treats the highest concentrations of VOCs, SVOCs, PCBs, and metals in the buried waste areas by LTTT, followed by solidification, if necessary. Contaminated soils will be treated in place by soil vapor extraction. If soil vapor extraction fails to meet final remediation levels then LTTT will be implemented for contaminated soils. Ground water will be treated onsite. The selected alternative thus satisfies the statutory preference for treatment as a principal element.

APPENDIX A

U.S. EPA ADMINISTRATIVE RECORD INDEX

AR

ORIGINAL

AMERICAN CHEMICAL SERVICE

GRIFFITH, INDIANA

06/26/92

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UPDATE #1

AMERICAN CHEMICAL SERVICE

GRIFFITH, INDIANA

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11	07/23/92	Bilcos, Mrs. S., Public	Martin, K., U.S.EPA	Comments on Proposed Plan for Remedial Action	3
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APPENDIX B

RESPONSIVENESS SUMMARY
AMERICAN CHEMICAL SERVICES
LAKE COUNTY, INDIANA

I. RESPONSIVENESS SUMMARY OVERVIEW

In accordance with CERCLA Section 117, 42 U.S.C. Section 9617, the United States Environmental Protection Agency (USEPA) held a public comment period from June 30, 1992, to July 29, 1992 to allow interested parties to comment on the Feasibility Study and Proposed Plan for remedial action at the American Chemical Services (ACS) site. As requested by the Potentially Responsible Parties, the public comment period was extended until August 28, 1992. USEPA presented the Proposed Plan to the public at a July 9, 1992, public meeting, where questions were answered and comments accepted from the public.

The purpose of this responsiveness summary is to document comments received during the public comment period and USEPA's responses to these comments. All comments summarized in this document were considered in USEPA's final decision for remedial action at the ACS site.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Limited community involvement has occurred for this site. In June 1989, the Agency for Toxic Substances and Disease Registry (ATSDR) was petitioned by local residents to evaluate the public health concerns associated with ACS. This public health assessment is expected to be completed soon.

Approximately 60 people attended the July 9, 1992, meeting, which focused on the results of the Feasibility Study and the Proposed Plan for remedial action.

Residents expressed concern at the July 1992 public meeting about the need for further investigation for the Griffith Municipal Landfill. Residents were also concerned that other areas of site contamination (i.e. disposal in wetland areas) were not fully investigated.

III. SUMMARY OF SIGNIFICANT COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND USEPA RESPONSES

The comments are organized into the following categories:

A. Summary of comments from the local community
   1. Comments from residents

B. Summary of comments from Potentially Responsible Parties

1. Comments from Warzyn, Inc., representing ACS Steering Committee

2. Comments from Karen Tallian, representing Town of Griffith, IN

3. Comments from Mark A. Rothschild, representing I.B. Distributors

4. Comments from James Tarpo, ACS

5. Comment from Barbara Magel, Karaganis & White

6. Comments from Barbara Magel and A. Bruce White, representing DeMert & Dougherty

7. Comments from Andrew Perellis, representing ACS RD/RA Organizational Group

8. Comments from William J. Anaya, representing Alumax

The comments are paraphrased, where appropriate, in order to effectively summarize them in this document. The reader is referred to the public meeting transcript and written comments available at the public repository for further information.

A. SUMMARY OF COMMENTS FROM THE LOCAL COMMUNITY

1. COMMENTS FROM RESIDENTS

1. Comment: It is not acceptable for ACS property to be unfit for public use after the cleanup is complete.

Response: It is the purpose of this remedy to restore contaminated property to an acceptable level that will allow unrestricted use of the property (to the extent allowed by local zoning laws). Cleanup levels included in the ROD would allow future residential use of the property. Ground water use restrictions may be necessary offsite until the contaminant plume is verified to be contained at site boundaries. Future use of ground water directly under the site is expected to be restricted. The LTTT system and ISVE technology will have to undergo treatability testing to determine if they will be able to attain final cleanup levels.

2. Comment: On-site thermal treatment proposed in the remedy may be dangerous to nearby residents as well as local wildlife.

Response: Emissions from the LTTT system will have to meet all Federal, State, and local guidelines in order to operate. Along with stack testing, ambient air monitoring will be required to verify that all standards are attained. The remedial investigation indicated that uncontrolled emissions from buried wastes are creating unacceptable potential risk to nearby residents. Implementing this remedial action will eliminate the source of these emissions. Additionally, it is a requirement of the record of decision to further evaluate onsite wetlands through additional sampling efforts and to continue to monitor the wetlands throughout the course of the remedy.

3. Comment: Further investigation, including investigation for buried drums and increased sampling efforts, is needed for the Griffith Municipal Landfill.

Response: The Griffith Municipal Landfill was included in the ACS remedial investigation, including the baseline risk assessment. Although ACS indicated that they had sent waste to the landfill, an indication which the Griffith Municipal Landfill officials denied, the investigation determined that the landfill is not now posing a significant threat to human health or the environment. The operating landfill is presently pumping water, which could contain whatever contamination is being generated by the landfill. At any rate, since the landfill is not posing a threat, no remediation or additional Superfund investigation is proposed at this time. The landfill is being, and will continue to be, monitored under State Law.

4. Comment: Are there any similarities between this site and the Ninth Avenue Dump Site in Gary, Indiana? Is it a similar kind of contamination? If so, why weren't similar technologies looked at that are already in operation there?

Response: Every superfund site possesses unique characteristics and problems that must be addressed on a site-specific basis. Both Ninth

Avenue Dump (NAD) and American Chemical Services (ACS) have contaminated soils and contaminated ground water. Some of the actual site contaminants are the same. However, the overall makeup of the contamination and the contaminant levels are quite different.

NAD contamination is believed to have been caused by the uncontrolled dumping of thousands of gallons of liquid industrial waste, creating a floating oil contaminant layer on the surface of the ground water, under the site. An underground barrier called a slurry wall will be constructed around the site to contain contamination while a ground water pump and treat system has been designed to both recover the floating oil and treat the discharged ground water to appropriate standards. The recovered oil will be shipped offsite to a licensed incinerator. Any excavated wastes will be thermally treated and the area contained by the slurry wall will be covered with a hazardous waste landfill cap.

ACS contamination has been caused by the burial of hazardous sludges, of possibly intact hazardous waste containing drums, and degraded or partially degraded hazardous waste containing drums. It has been estimated that up to 30,000 drums were buried at ACS. A floating oil layer similar to Ninth Avenue's has not been observed at ACS. ACS contamination will be addressed through thermal treatment of buried waste, in-situ vapor extraction of contaminated soils and ground water pump and treat. The slurry wall implemented for NAD was similar to one of the potential remedial alternatives for American Chemical Services. However, it was not chosen as the recommended remedy due to the nature of ACS's contamination. Treating the contaminant source areas by excavation and thermal treatment will provide a more permanent and immediate solution than containment.

5. Comment: How much contaminated ground water is associated with the American Chemical Services Site?

Response: Both Upper and Lower Aquifer ground water has been contaminated by ACS site related activities. The volume of Upper Aquifer contamination can be estimated by multiplying the areal extent of the contaminated aquifer (3000' x 2000') by the

average saturated thickness (12') by its porosity (.25) giving a value of 18,000,000 cubic feet.

The volume of Lower Aquifer contamination can be estimated by multiplying the areal extent of the contaminated aquifer (1500' x 750') by the estimated vertical extent of contamination (20') by its porosity (.25) giving a value of 5,625,000 cubic feet.

The total estimated Upper and Lower Aquifer contamination is therefore 23,625,000 cubic feet or approximately 176 million gallons.

6. Comment: Does the American Chemical Services facility have backflow prevention devices on their wells to prevent any further contamination in case of cross-connections inside the chemical plant?

Response: Yes. ACS does have backflow prevention devices on their wells.

7. Comment: Several commentors submitted letters of support asking U.S. EPA to implement the proposed remedy as quickly as possible.

Response: These comments were considered in adopting the selected remedy. U.S. EPA is well aware of the need to provide expeditious remediation of Superfund sites, within the constraints of the statute and implementing regulations.

B. Summary of Comments from Potentially Responsible Parties

1. Comments from Warzyn, Inc., on behalf of the ACS Steering Committee

1. Comment: U.S. EPA did not include specific clean-up levels in the Proposed Plan and should therefore not include clean-up levels in the ROD without providing opportunity for public comment.

Response: Proposed human-health based clean-up levels were included as item # 203 in the Administrative Record as a supplement to the Feasibility Study on June 30, 1992. The Proposed Plan also identified that health-based cleanup standards would be required.

2. Comment: Health-based standards are not appropriate for this site, however, if they are required they should not be included in the ROD but should be developed during the negotiating period for the remedial design. The U.S. EPA has not thoroughly evaluated all factors that need to be considered in developing health-based standards.

Response: U.S. EPA has thoroughly evaluated the health-based standards included in the ROD. The National Contingency Plan requires that 10-6 risk level be used as the point of departure for determining remediation goals for alternatives when there are multiple contaminants or multiple pathways of exposure at a site, with acceptable exposure levels of an excess upper bound lifetime cancer risk to an individual of between 10-4 and 10-6. ARARs or technology-based standards alone cannot determine if this standard has been met. The PRPs were aware that clean-up standards were required as part of the Feasibility Study based on the July 18, 1991, and the September 30, 1991, U.S. EPA comments. Unfortunately, the PRPs chose not to develop clean-up standards.

3. Comment: The baseline risk assessment should not be used to develop clean-up standards because it represents an absolute worst case approach rather than the reasonable maximum exposure approach.

Response: An absolute worst case approach was not used to develop clean-up standards. Reasonable maximum exposure levels, taken from the risk assessment, were used to develop the clean-up standards represented in the ROD. Baseline risk assessments are based on reasonable maximum exposure scenarios. Reasonable maximum exposure values are considered appropriate by U.S. EPA for generating cleanup levels.

4. Comment: Reducing all waste concentrations to health-based levels is not consistent with current guidance. Remedies should either reduce all wastes to health-based levels or manage contaminants to such an extent that there is a high degree of certainty that future exposures will not harm human health or the environment. The proposed plan should reflect that containment is consistent with U.S. EPA guidance and appropriate for the less mobile constituents at the site.

Response: The site remedy is designed to reduce site contaminants to health-based levels. Because the future on-site resident scenario was considered an appropriate land-use scenario in the baseline risk assessment, it is therefore appropriate to set clean-up levels based on this land use. Containment proposed by the PRP's (pump and treat, institutional controls) would not be protective of future on-site residents.

5. Comment: It is inappropriate to set non-volatile constituent standards for ISVE, because ISVE is not expected to treat non-volatile contaminants. The ROD should specifically state that the ISVE pilot project is for designing appropriate well spacings and air flow requirements rather than to demonstrate the ability of ISVE to meet established health-based clean-up criteria.

Response: The purpose of the pilot must be to determine if ISVE has the potential to meet established clean-up levels. If the potential to meet these standards cannot be demonstrated then ISVE would be abandoned in favor of LTTT.

6. Comment: If health-based standards are set beyond the treatment capability of ISVE then LTTT is really the selected technology and a significant change to the Proposed Plan has occurred; requiring a revised Proposed Plan and new public comment period.

Response: It has not been proven through treatability testing that ISVE will not be capable of meeting health-based clean-up standards. The ability of ISVE to remediate certain semi-volatile contaminants is indeed questionable and, as mentioned in the Proposed Plan, is unproven on a contaminant matrix and scale found at ACS. Enhanced bioremediation through nutrient addition during ISVE could potentially reduce remaining SVOCs to produce a cumulative cancer risk within the established risk range. Implementation of ISVE may prove most beneficial by reducing VOCs in the soil to a level that will not require vapor emission control prior to excavation for LTTT. Because it has not been field verified that SVOCs always accompany VOCs in contaminated soil, ISVE may reduce the amount of material that would need to be treated by LTTT.

A provision has been included in the ROD that would allow complete abandonment of ISVE technology as part of this remedy. This contingency would, in effect, require the implementation of alternative 7b for ACS site contaminants. Because alternative 7b is described in the proposed plan as an alternative considered for the ACS site, a revised Proposed Plan or new public comment period would not be necessary for its implementation.

7. Comment: A pilot test should be allowed for ISVE in the Off-Site Containment Area.

Response: The U.S. EPA believes the pilot study as proposed by the PRPs will delay the initiation of remedial action for the most toxic contaminants at the site. The more important consideration here is that U.S. EPA does not believe ISVE to be an appropriate technology for Off-site Containment Area buried wastes because of the large number and random distribution of buried drums. Buried drums would undoubtedly interfere with ISVE performance. Contaminants sequestered in intact, crushed or even partially degraded drums would be difficult to extract and could become increasingly mobile contaminants as drum degradation progresses.

8. Comment: U.S. EPA should allow the opportunity to determine the condition of buried drums in the Off-site Containment Area through an investigative test pit program.

Response: Based on the large number of drums believed to exist in the Off-site Containment Ares and the possibility of sequestered contaminants, further investigation at this point in time is unnecessary and would not alter the need for excavation. The remedy requires excavation and low-temperature thermal treatment in the Off-site Containment Area. Excavated intact buried drums will be sent to a licensed offsite hazardous waste incinerator. Miscellaneous debris will be steam-cleaned within the area of contamination and sent to a licensed Subtitle D landfill.

9. Comment: Several residents stated during the public meeting that drums were not placed below the water table in the Off-site Containment Area, rather they were

placed on the ground and simply covered with soil. If this statement is confirmed during additional investigations then ISVE could be an effective method at addressing the Off-site Containment Source Area.

Response: One resident stated this to the U.S. EPA representative after the public meeting was officially closed. Even if his belief was true the problem of treating contaminants sequestered in buried drums through in-situ methods still exists.

10. Comment: Remediation goals should be technology-based rather than health-based.

Response: Basing site remediation solely on the basis of a particular technology's limitations is not protective of human health and the environment. The NCP states that an acceptable risk range is 10-6 to 10-4. Because of the PRPs recalcitrance in proposing clean-up standards, U.S. EPA was forced to set the clean-up levels. These levels were evaluated through surveying current LTTT and ISVE vendors. The results of this survey indicate that LTTT is a favorable technology for meeting the clean-up levels in the ROD. ISVE, as it is stated in the Proposed Plan, is unproven at treating all SVOC contaminants to ROD clean-up levels. Treatability studies will be performed to evaluate ISVE's effectiveness at meeting ROD clean-up levels.

11. Comment: If technology-based goals are not selected than the exposure scenarios used to develop health-based goals should be limited to trespassers and on-site workers. Additionally, U.S. EPA proposed clean-up levels should be based upon a cancer risk of 1x10-4 rather than 1x10-6.

Response: The exposure scenarios used to develop health-based clean-up standards are those scenarios defined in the baseline risk assessment. Based on these scenarios, U.S. EPA has set a policy to manage excess cancer risk within the 10-4 - 10-6 range.

12. Comment: Clean-up levels should not be set in the ROD because U.S. EPA is reconsidering its approach to

evaluating risk by including risk posed to an average person (i.e., central tendency) rather than only the people at the high end of the exposure range. National clean-up standards for contaminated soils are also under development.

Response: U.S. EPA cannot delay clean-up level decisions based on possible changes that might occur in the future. Moreover, the inclusion of the central tendency in new risk assessment starts is to define the range of risks likely to be present to the general population. It is realized that the central tendency is the median risk (i.e., does not consider risks to the most sensitive sub-populations such as children, pregnant women, etc..). Clean-up standards are to be based on the reasonable maximum exposure scenarios. To set clean-up standards at the central tendency risk level would be protective for only 50% of the population, leaving the upper 50% vulnerable to adverse health effects.

13. Comment: Another potential approach to setting remediation goals would be to utilize the Concentration-based exemption criteria (CBEC) outlined in U.S. EPA's proposed rule published in the federal register (May 20, 1992).

Response: This approach is outlined in a proposed rule that is not expected to be final until the spring of 1993. U.S. EPA cannot set remediation goals based on a proposed rule that is not yet Agency policy.

14. Comment: A pilot study in the Off-site Containment Area will not delay the RD/RA process and can be performed in conjunction with the required pilot study for the On-site Area.

Response: The PRPs have proposed a sequential approach to testing alternative technologies in the Off-site Containment Area. The U.S. EPA believes the pilot study as proposed by the PRPs would delay the initiation of remedial action for the most toxic contaminants at the site. As previously stated, the more important consideration here is that U.S. EPA does not believe ISVE to be an appropriate technology for Off-site Containment Area buried wastes because of the large number and random distribution of buried drums.

15. Comment: The proposed remedy imposes short-term risk to workers and potentially to nearby residents, due to the excavation of waste materials in the Off-site Containment Area.

Response: A health and safety program which requires the use of personal protection equipment for worker involved in site remediation should minimize short-term risk during implementation of the selected remedy. The Proposed Plan states that VOC emissions from site excavation activities must be controlled. Control can be accomplished by a number of methods, including ISVE prior to excavation.

16. Comment: The U.S. EPA compares the costs of the preferred remedy unfairly with the costs of other alternatives. This results in an unbalanced evaluation of the cost effectiveness of the modified Alternative 6b.

Response: The costs of the preferred remedy are based on assumptions on the effectiveness of ISVE to treat some buried waste materials and contaminated soils to health-based standards. If ISVE is proven ineffective at meeting health-based standards then LTTT will be implemented and costs could potentially exceed the range defined for the preferred alternative in the Proposed Plan. The ROD requires implementation of a remedial action similar to Alternative 7b, if all treatability studies for ISVE fail. Alternative 7b costs, although higher than 6b, compare favorably with other alternatives.

17. Comment: The proposed plan indicated that lead contaminated soils be immobilized to meet characteristic treatment standards for metals. This requirement is not warranted since lead and other metals are not identified as target compounds in the upper aquifer.

Response: The clean-up standard for lead is not based on the contaminant's ability to migrate to ground water but is based on U.S. EPA policy outlined in guidance on the management of lead contamination at Superfund sites. Additionally, U.S. EPA is considering a more site specific lead clean-up standard based on the Uptake Biokinetic Model. Treatment residuals from the LTTT system must be

tested to verify that all target analyte list metals are below RCRA hazardous waste characteristic levels before being redeposited as clean soil.

18. Comment: The 10 ppm PCB clean-up action level is not appropriate for this site.

Response: The 10 ppm PCB clean-up action level is based on the requirements for PCB spill clean-up outlined in 40 CFR 761.125 (c)(4)(v) which states that soil contaminated by PCBs at 10 ppm will be excavated to a minimum depth of 10 inches. Excavated soils will be replaced with clean soil containing PCBs less than 1 ppm. Additionally, U.S. EPA's Guidance on Remedial Actions for Superfund Sites with PCB Contamination suggests a 1 ppm PCB clean-up level, providing a 10-5 excess cancer risk, under the residential use scenario. Adding a 10" soil cover provides an additional order of magnitude protection. Therefore, a 10 ppm clean-up level with 10" soil cover will provide protection under the future residential use scenario at the 10-5 excess cancer risk level.

19. Comment: The Proposed Plan requires vapor emission controls during excavation of wastes. The Proposed Plan should allow for ambient air monitoring prior to the imposition of the use of structures.

Response: Vapor emissions will be contained during excavation if ambient air monitoring identifies unacceptable emissions.

Below are responses to comments provided by Warzyn on the U.S. EPA Ecological Assessment:

20. Comment: Several U.S. EPA documents were not correctly cited or were not included in the reference section and many of the methods employed by U.S. EPA were considered inappropriate by the PRPs.

Response: U.S. EPA notes the possibility of minor errors in the Agency-produced ecological assessment. These errors do not change the ecological assessment conclusions that additional work is necessary in the wetlands as part of the remedial design.

Comment: Maximum concentrations from ground water wells were used to evaluate contaminants of concern in the wetlands. U.S. EPA guidance suggests use of the 95% upper confidence limit to be representative.

Response: Current guidance suggests both the maximum and the 95% upper confidence limit to be representative. Without additional field work, the most conservative approach must be employed.

22. Comment: Appropriate indicator species were not selected. Mink are not likely to be present at the site.

Response: Mink are used by U.S. EPA as an indicator species as a conservative benchmark when PCBs are present along waterways.

2. Comments from Karen Tallian, representing Town of Griffith, IN

1. Comment: The town of Griffith needs assurance that the discharge waters would not violate the Sewer Use Ordinance or otherwise contain any substances which could damage their sewer system in any way and that the waste would be acceptable to treatment by the Hammond Sanitary District.

Response: The discharge option to the Hammond Sanitary District has been eliminated from the remedy due to Hammond's poor compliance history.

2. Comment: Additional information is needed on the quantities and type of treated effluent to be pumped to the town of Griffith sewer system for eventual treatment at the Hammond POTW. The town would need reimbursement for any changes made to handle additional flows and would need to know the composition of the waste to be able to check to see if it can be treated by the Hammond Sanitary District.

Response: The discharge option to the Hammond Sanitary District has been eliminated from the remedy due to Hammond's poor compliance history.

3. Comment: I.C. 13-7-16.6-9 prohibits incineration of materials contaminated with or including PCBs. At the public hearing, EPA simply stated that low-temperature thermal treatment is not the same as

incineration, but we believe this interpretation is questionable.

Response: At the public hearing, a representative from the Indiana Department of Environmental Management (IDEM) stated that LTTT was not incineration and PCB treatment by LTTT did not violate Indiana law. IDEM has forwarded comments pertaining to the applicability of State laws prohibiting thermal treatment of PCBs and has provided the following response:

I. IC 13-7-8.5-11 which states that a permit may not be issued for the construction or operation of an incinerator for the destruction of PCB and operated as a hazardous waste facility if the incinerator:

1) burns or will burn municipal waste to fuel the incineration process; and
2) is or will be in a solid waste management district.

II. IC 13-7-16.5-9 which states that a person may not incinerate PCB in an incinerator unless the person holds a permit issued by the commissioner specifically authorizing the incineration of PCB in the incinerator.

The commissioner may not:

1) issue; or

2) consider an application for; a permit specifically authorizing the incineration of PCB until the study required is concluded.

This study; however, must include an assessment of the efficiency and the technical and economic feasibility of alternative technologies such as the low temperature thermal desorption process.

Low temperature thermal treatment (LTTT), a part of the recommended remedy for the ACS site, is not considered an incineration process. LTTT is actually one of the alternative technologies which should be considered versus incineration according to the statute. Consequently, the proposed remedy for the ACS site would not violate Indiana Law.

4. Comment: The town is concerned that LTTT may not be adequate to treat site contaminants, resulting in later high-temperature treatment. The town is concerned that this could happen through later administrative decisions without a public hearing and input from the citizens and officials of the town of Griffith.

Response: U.S. EPA has evaluated the potential adequacy of LTTT meeting remediation levels. Preliminary evaluation indicates that LTTT can be designed to meet remediation levels. If it is necessary to make a fundamental change to the ROD the public would have the opportunity to provide input on such a change.

5. Comment: The town expresses concern that the LTTT system will produce toxic air emissions that are not adequately filtered out or that otherwise violate Federal and/or State clean air standards.

Response: Emissions from the LTTT system will have to meet all Federal, State, and local guidelines in order to operate. Along with stack testing, ambient air monitoring will be required to verify that all standards are attained.

3. Comments from Mark A. Rothschild, representing I.B. Distributors (formally Illinois Bronze Paint Company).

1. Comment: The Agency has refused to meet with the PRPs to discuss the Agency's recent selection of a new alternative remedy. We request that the Agency delay ROD issuance until such time as the PRPs have had the opportunity to meet with the Agency and discuss it's comments and proposals in person. As an alternative, make provisions within the ROD so as to provide for the design and implementation of the pilot study programs that the committee has set forth in it's recent correspondence with the Agency.

Response: The Agency has not changed its position on the recommended remedy at the site. The PRPs formally requested a meeting with U.S. EPA on July 29, 1992. The Agency turned down this request because it does not negotiate remedy selection. The Agency asked the requestors to submit comments on the proposed plan as outlined in the NCP. Other meetings have been proposed by the PRPs or their

contractor to clarify comments submitted by the PRPs. U.S. EPA has found the comments submitted to be clear and clarification to be unnecessary.

Pilot studies are part of the remedial action outlined in the ROD. As discussed in Comment # 7 of Section III.B.1 of this responsiveness summary, the Agency does not believe a pilot study for ISVE in the Off-site Containment Area is appropriate. In fact, results could be misleading, presenting a false sense of security of ISVE effectiveness in an area known to contain numerous buried drums.

4. Comments from James Tarpo, ACS

1. Comment: Because of the nature of materials, including cyanide and VOCs, buried in the Off-site Containment Area, the implementation of the selected remedy may result in an increased and immediate risk to humans and the environment. Additionally, all buried drums and the tanker truck were crushed prior to disposal.

Response: ACS has previously presented its opinion on safety concerns as they relate to buried cyanides. U.S. EPA responded to this concern by reviewing known cyanide contamination and its relation to implementation of the preferred alternative (Administrative Record item #186). It was determined that known cyanide contamination would not adversely affect the implementation of the preferred remedy. However, U.S. EPA recognizes that Health and Safety concerns with excavation of hazardous chemicals are very real. A detailed Health and Safety Plan will be implemented to protect remedial workers. Additionally, because of U.S. EPA's concern with excavation emissions, it was necessary to supplement Alternative 6b to include VOC emission control to protect ACS workers and nearby residents from exposure to hazardous emissions. This control was not addressed in the PRP-produced Feasibility Study.

U.S. EPA takes note of ACS's contention that it was the general practice to smash drums placed in the Off-site Containment Area. However, documented adherence to this general practice is not available. The potential for intact drums or partially crushed drums to contain sequestered contaminants that would not be remediated by in-situ methods cannot be ignored.

5. Comment from Barbara Magel, Karaganis & White

1. Comment: In dealing with a thermal desorption unit involving Heritage Environmental Services both the IDEM and U.S. EPA have determined that the unit was in fact an incinerator for regulatory purposes. Given this fact the treatment unit proposed for the ACS site must also be viewed as an incinerator and be subject to the statutory requirement of the State of Indiana and therefore may not properly be selected as an NCP-compliant remedial alternative.

Response: The determination that the Heritage thermal desorption unit was in fact an incinerator was made based on the specific operating parameters and design of that unit. This determination has no bearing on the general policy of IDEM that low-temperature thermal treatment is not incineration. For specifics, please refer to the response to Comment # 3, Section III.B.2, of this responsiveness summary.

6. Comments from Barbara Magel and A. Bruce White, representing DeMert & Dougherty

1. Comment: In adopting Alternative 6b, the Agency did not comply with the NCP mandate to select the most cost-effective alternative.

Response: The NCP does not mandate that the most cost-effective alternative be selected. The NCP requires that cost-effectiveness be considered as one of the nine criteria used to select the most appropriate alternative. U.S. EPA then selects the alternative that provides the best balance with respect to the nine criteria.

2. Comment: The Agency has relied on an incomplete accounting of costs of the selected alternative. No cost is included in EPA's figures for stabilization or RCRA capping at the site.

Response: It is noted that Feasibility Study alternatives included an incomplete accounting of costs. U.S. EPA has done its own cost estimates for components of the remedy and they are included in the ROD.

3. Comment: The primary basis for selecting LTTT in the Off-site Containment Area relies on the assumption that area contains intact, full, buried drums of waste.

Response: This is an incorrect conclusion concerning U.S. EPA's basis for selecting LTTT in the Off-site Containment Area. U.S. EPA selected LTTT for the Off-site Containment Area because of the large number and random distribution of buried drums. It is not known whether or not these drums are intact, however, even if no intact drums exist, sequestered contaminants in partially degraded drums would be very difficult to extract by in-situ methods.

4. Comment: The Agency has failed to consider short term risks associated with excavation of contaminated soils and wastes.

Response: As stated in the PRP-produced Feasibility Study, "A health and safety program which requires the use of personal protection equipment for remediation contractor workers should minimize short-term risk during implementation of Alternative 6." Potential short-term risks to nearby residents or ACS workers were not addressed by the PRPs in the Feasibility Study. U.S. EPA has included provisions in the final remedy to control VOC emissions during excavation of contaminated material.

5. Comment: The Agency is not complying with ARARs by selecting a remedial action that thermally treats PCBs.

Response: The Feasibility Study states that all ARARs will be met for Alternative 6b. It is inferred that this comment pertains to a belief that thermally treating PCBs is illegal in the State of Indiana. This concern is addressed in the response to Comment # 3, Section III.B.2, of this responsiveness summary

6. Comment: The Agency-produced ecological assessment of the onsite wetlands relies on overly conservative unrealistic assumptions.

Response: Comments on the ecological assessment were submitted for inclusion in the Administrative Record. They are addressed in Section III.B.1 of this responsiveness summary.

7. Comment: No health-based standards have been made available to the public for review and comment. The Agency has reviewed and approved the Feasibility Study using technology based standards.

Response: The human-health based preliminary remediation goals (PRGs) were produced by U.S. EPA and included in the Administrative Record as item # 203. Development of PRGs is generally done early is the RI/FS process. U.S. EPA repeatedly requested the PRPs to develop proposed clean-up standards; they refused. The Feasibility Study submitted by the PRPs was considered adequate to make a remedial action decision only after being supplemented by U.S. EPA. Additionally, technology-based clean-up standards have never been formally proposed by the respondents. U.S. EPA was forced to supplement the Feasibility Study with Preliminary Remediation Goals and to develop and finalize site clean-up standards.

8. Comment: It is problematic to propose a specific technology such as LTTT without any definition of the goals to be attained by that treatment.

Response: One of the goals of the Feasibility Study and therefore the alternatives was "to ensure that public health and the environment are not exposed to cancer and non-cancer risks greater than the acceptable risk range from drinking water, soils, buried drums/liquid wastes/sludges, or other substances from the ACS site. " It is now clear that this goal would never have been attained under the PRP's remedial philosophy espoused in the Feasibility Study. Because of this, the U.S. EPA was forced to perform much of the work needed to determine the effectiveness of the proposed remedial technologies and their abilities to attain this goal. The U.S. EPA has set clean up standards and evaluated the ability to attain these standards through the proposed technologies.

9. Comment: The selected alternative is not consistent with U.S. EPA's PCB spill regulation or its Land Disposal Restriction requirements.

Response: The 10 ppm PCB clean-up action level is based on the requirements for PCB spill clean-up outlined in 40 CFR 761.125 (c)(4)(v) which states that soil contaminated by PCBs at 10 ppm will be excavated to a minimum depth of 10 inches. Excavated soils will be replaced with clean soil containing PCBs less than 1 ppm. Additionally, U.S. EPA's Guidance on Remedial Actions for Superfund Sites with PCB Contamination suggests a 1 ppm PCB clean-up level, providing a 10-5 excess cancer risk, under the residential use scenario. Adding a 10" soil cover provides an additional order of magnitude protection. Therefore, a 10 ppm clean-up level with 10" soil cover will provide protection under the future residential use scenario at the 10-5 excess cancer risk level.

The land disposal restrictions (LDRs) are applicable to this site since the remedy involves excavation, treatment and placement of treated residuals. The LDRs provide for the use of LDR treatability variance levels for soil or debris contaminated with a RCRA listed waste. However, because LDR treatability variance levels only require that contaminants be reduced by 90-95% they have been determined not to be protective for the ACS site.

10. Comment: The Administrative Record is lacking the following documents: 1) A statement from IDEM supporting the selected remedy; 2) A listing of ARARs from IDEM; 3) All relevant information on the Ecological Assessment; 4) Documents supporting many of the Agency's decisions underlying the selection of Alternative 6b.

Response: 1) A statement from IDEM supporting the selected remedy is now included in the Administrative Record. It is standard procedure to include this statement after the public comment period to allow IDEM the necessary time to formalize their recommendations based on all pertinent information, including public comments received.

2) IDEM provided U.S. EPA with ARARs by letter dated June 6, 1991. This letter was included in the Administrative Record as item # 148 and described as Feasibility Study comments. ARARs from the Water Division and the U.S. Army Corps of Engineers were also provided the PRPs in this manner.

the Cleanup Standards set forth in Appendix A, provided they submit to U.S. EPA and the State (as part of the RD work plan) a plan detailing such a procedure.

E. Construction, Installation and Operation of Treatment Systems for Remedial Action

1. Groundwater Restoration System

The Settling Defendants shall design and install a groundwater extraction and treatment system to restore groundwater to performance standards. The Settling Defendants shall operate the groundwater extraction system until the groundwater performance standards (cleanup standards) are met throughout the Area of Attainment. The Area of Attainment for groundwater Cleanup Standards shall include all areas outside the site boundary where contamination levels exceed the performance standards. These groundwater performance standards shall consist of MCLs for those individual carcinogenic contaminants where the MCL corresponds to a cancer risk of less than 1 x 10-6. For individual contaminants where the MCLs exceed a 10-6 carcinogenic risk, the performance standards for the individual contaminants shall be levels that equal a carcinogenic risk of 1 x 10-6. The performance standards for individual noncancer contaminants consist of levels that represent a noncancer risk of Hazard Quotient (HQ) = 1. The performance standards are listed in Table 7 of the ROD which is attached hereto as Appendix B.

There are fifteen carcinogenic contaminants in Appendix B. Ten carcinogenic contaminants have performance standards set at a 1 x 10-6 level, resulting in a cumulative cancer risk of 1 x 10-5 for these ten contaminants. The other five carcinogenic contaminants have performance standards set at MCLs, resulting in a cumulative cancer risk of 3 x 10-6, for these five contaminants. The total cancer risk for the fifteen carcinogenic contaminants is therefore 1.3 x 10-5.

In the event risk-based performance standards for individual contaminants cannot be attained, the performance standards shall be based on a cumulative risk that shall not exceed a 1.3 x 10-5 cumulative cancer risk and a Hazard Index (HI) < 1.0 cumulative noncancer risk. Performance standards for individual contaminants based on MCLs cannot be exceeded.

If additional compounds are found to be above MCLs or Health based standards as identified in the ROD during any monitoring event, those compounds shall be added to Appendix B and Table 7 of the ROD and an appropriate groundwater performance standard will be calculated by U.S. EPA, after reasonable

opportunity for review and comment by the State. The cumulative carcinogenic risk of 1.3 x 10-5 and cumulative HI less than 1.0, as specified in the ROD, shall not be exceeded. The carcinogenic risk and HI shall be calculated using the methods set forth in the Risk Assessment Guidance for Superfund (RAGS).

The Settling Defendants shall install and operate an extraction system that shall consist of a network of wells designed to completely capture and remove contaminated groundwater within and downgradient of the point of compliance defined in the ROD as the down-gradient site boundary. The Settling Defendants shall design the extraction wells to be capable of pumping sufficient quantities of groundwater to capture and extract the entire contaminated plume within the area of attainment.

The Settling Defendants shall pump the extracted groundwater to the groundwater treatment system for removal of chemicals to their discharge performance standards, as approved by U.S. EPA, after reasonable opportunity for review and comment by the State, prior to discharge to Turkey Creek or one of its tributaries and the western wetlands. Settling defendants shall meet all conditions and limitations imposed by U.S. EPA, after reasonable opportunity for review and comment by the State, on discharge of treated groundwater into surface waters and wetlands. The specifics of the groundwater treatment process shall be implemented as determined by U.S. EPA, after reasonable opportunity for review and comment by the State, during design. The groundwater treatment process is expected to include technologies involving air stripping, UV/Oxidation, chemical precipitation, and carbon absorption. Residuals from the ground water pump and treat process will be sent off-site for disposal or recycling, as appropriate.

The Settling Defendants shall monitor the system's performance for a minimum of 30 years. U.S. EPA, after reasonable opportunity for review and comment by the State, may require adjustments or enhancements to the system as warranted by the performance data collected during operation. Examples of adjustments which U.S. EPA may require include, but are not limited to, additional groundwater extraction wells, increased pumping rates, pulsed pumping, injection wells, nutrient introduction and bioremediation.

If, after full operation of the groundwater extraction and treatment system for a period of at least five (5) years, and operation of the system following implementation of any and all modifications required by U.S. EPA, after reasonable opportunity for review and comment by the State, for at least three (3) years, Settling Defendants believe that it is technically impracticable to achieve the Cleanup Standards set

forth above, then Settling Defendants may petition to U.S. EPA to modify the Cleanup Standards, based on a demonstration, in accordance with the provisions of Section 121(d)(4)(C) of CERCLA, that compliance with the Cleanup Standards is technically impracticable from an engineering perspective.

The Settling Defendants may petition U.S. EPA to terminate the groundwater extraction and treatment system after a demonstration that the groundwater performance standards have been met throughout the area of attainment. The demonstration shall consist of three years of consecutive quarterly monitoring during which none of the contaminants exceeds any performance standard in any of the wells in the monitoring network. Monitoring shall be for U.S. EPA Contract Laboratory Program's Target Analyte List/Target Compound List and other parameters approved during design. Upon U.S. EPA's approval of the petition, after reasonable opportunity for review and comment by the State, Settling Defendants may terminate the groundwater extraction treatment system. Review of the petition shall be in accordance with the Consent Decree.

U.S. EPA may require Settling Defendants to continue full or partial operation of the extraction and treatment system after Cleanup Standards are achieved, if U.S. EPA, after reasonable opportunity for review and comment by the State, determines that hydraulic containment to prevent the migration of contaminants exceeding the Cleanup Standards set forth above is necessary to protect human health and the environment.

After termination of the operation of the groundwater extraction and treatment system, Settling Defendants shall reactivate the groundwater extraction and treatment system immediately if any groundwater monitoring indicates that the groundwater performance standards are exceeded at any point of compliance as defined in Section II.F.5. of this SOW.

Air emissions from the groundwater treatment system shall not exceed the standards set forth in Section II.F.3.

2. Excavation and Treatment of Buried Waste

The Settling Defendants shall excavate and treat all buried waste that are or that contain hazardous substances, pollutants or contaminants above the performance standards identified in Appendix A by thermal treatment in an on-site low-temperature thermal treatment (LTTT) Unit. Settling Defendants shall perform treatability tests designed to determine operating parameters needed for LTTT to achieve remediation levels set forth in Appendix A. The following soils and waste are considered buried waste and will be excavated and treated by LTTT to meet clean up standards:

- Areas of Contamination with total Volatile Organic Compounds (VOCs) in excess of 10,000 ppm in the Off-site Area (as defined in the ROD and this SOW);

- Soils contaminated with PCBs at a level greater than 10 ppm in both the On-site and Off-site Areas; and

- Isolated VOC-contaminated soil not within the areas to be addressed by In-situ Soil Vapor Extraction (ISVE).

The Settling Defendants shall treat source material to obtain the performance standards outlined in Appendix A. The cumulative carcinogenic risk of 3.3 x 10-5 and cumulative HI < 1.0, as specified in the ROD, shall not be exceeded. The 3.3 x 10-6 cumulative cancer risk is based on the fact that thirty-three individual carcinogenic contaminants have performance standards set at a 1 x 10-6 risk level. The carcinogenic risk and hazard index shall be calculated using the methods set forth in RAGS. The Settling Defendants shall test the treatment residuals and redeposit the residuals on-site if all treatment standards specified in Appendix A are attained. LTTT treatment residuals must contain less than 2 ppm PCBs to be redeposited on-site.. A 10-inch clean soil cover shall be placed over PCB-contaminated areas greater than 1 ppm and less than 10 ppm. The Settling Defendants shall manage other residues and condensate from the treatment process in accordance with the approved design.

Soils containing greater than 500 ppm lead in both the On-Site and Off-Site Areas will also be excavated, possibly treated by LTTT to remove VOCs and SVOCs (if fugitive emissions exceed ambient air monitoring standards), and sent off-site for disposal. Contaminated soils that fail the TCLP characteristic hazardous waste test for any constituent without an identified cleanup standard shall be sent off-site for disposal.

Air emissions from the LTTT system shall not exceed the standards set forth in Section II.F.3.

The Settling Defendants shall excavate intact buried drums and send them off-site to a licensed hazardous waste incinerator. Miscellaneous debris removed during excavation activities will be steam-cleaned within the area of contamination and sent off-site for disposal. The Settling Defendants shall manage condensate or other residue from the treatment process in accordance with the approved design. Air emissions from the LTTT system shall not exceed the standards set forth in Section II.F.3.

3. In-situ Vapor Extraction Pilot Study

Settling Defendants shall have the option to design and construct an ISVE pilot project to be implemented in the On-site Area to evaluate the effectiveness of the technology on buried waste materials. This pilot study will be in conjunction with the ISVE system to be developed for all contaminated site soils, as described in Section II.E.4. With U.S. EPA's approval, after consultation with the State, studies assessing ISVE's effectiveness on buried waste material may be abandoned in favor of implementing LTTT for all buried wastes.

The performance criteria and the design and schedule of the pilot study shall be established in the Pre-Design Work Plan. The performance period will be a minimum of two months but no longer than the time it takes to implement treatment for source materials in the Off-site Area.

The Pre-Design Work Plan shall include, at a minimum, the location within the On-site Area where the pilot study is to be conducted, the operation parameters, i.e., number of extraction wells, pumping rate, etc., to be used during the pilot study, and the time necessary to conduct and complete the pilot study. At the conclusion of the Pilot Study performance period, the Settling Defendants shall present the results through a Pilot Study Report. The underlying data developed during the Pilot Study shall be made available to the U.S. EPA and the State upon request. The Pilot Study shall determine the most efficient design parameters for full-scale implementation of ISVE in the On-site Area. The design parameters shall include, at a minimum, the number of extraction and injection wells, spacing between wells, extraction pumping rate, and off-gas treatment requirements.

The Settling Defendants shall conduct sampling activities to characterize the physical parameters of the buried waste source areas/contaminated soils, including, but not limited to, moisture content, grain size distribution, and total organic carbon. As part of the Pre-Design Work Plan, Settling Defendants shall develop the sampling plan necessary to conduct this sampling activity.

The pilot study location shall be in an area of the On-site Area with representative contamination and geology. A sampling grid will be established that includes sampling nodes at a variety of distances from extraction wells. Pre-treatment analysis for Volatile Organic Compounds (VOCs) and Semi-volatile Organic Compounds (SVOCs) in soil and soil gas will be accomplished at each node. Wellhead gas, separator outlet gas, and separator drain water will be sampled at 8-hour intervals for the first week of the pilot study, at 12-

hour intervals for the second week, and daily thereafter. The mass of removed contaminants will be totaled. After the performance period is complete, samples will be taken as close as possible to pre-treatment samples and analyzed for the same parameters. A mass balance will be performed for the treatment period. The pilot study results shall be used to predict the feasibility and approximate length of time required for the ISVE technology to attain cleanup standards or appropriate total risk levels for contaminants. Condensate from the pilot study shall be managed in accordance with the approved pre-design. Air emissions from the LTTT system shall not exceed the standards set forth in Section II.F.3.

At the end of the performance period U.S. EPA, in consultation with the State, will determine if in-situ soil vapor extraction will attain the performance standards outlined in Appendix A for these buried wastes. Confirmation sampling will be required. If the U.S. EPA, after consultation with the State, determines that the technology is capable of meeting remediation levels then it may be expanded to unremediated portions of the On-site Area. Enhancements to the ISVE system described below (in the section on treatment of contaminated soils) may also be tested on buried waste materials in an effort to prove potential attainment of cleanup standards outlined in the ROD. If the U.S. EPA, after consultation with the State, determines that ISVE will not attain the performance standards for buried wastes then LTTT will be implemented for all buried wastes. In the event Settling Defendants request that this ISVE pilot study not be implemented or be abandoned after implementation, and U.S. EPA, after consultation with the State, approves the request, Settling Defendants shall implement LTTT for all buried wastes.

The potential benefit derived from successful demonstration of ISVE's effectiveness on On-site Area buried waste would be a decrease in the overall cost of remediation and a reduction of the amount of material that would have to be handled for LTTT. If the technology doesn't provide a potential to meet remediation levels or if pilot studies are not conducted then LTTT will be implemented for all buried wastes and contaminated soils.

Even if the pilot study fails to demonstrate that ISVE can meet remediation levels for both buried wastes and contaminated soils, the potential decrease in VOCs might negate the need for elaborate VOC emission control during buried waste excavation, contaminated soil excavation, drum removal, and transportation of waste material and contaminated soil to the Off-site Area LTTT System.

3) All relevant information regarding the review of the PRP-submitted ecological assessment has been included in the Administrative Record.

4) All documents pertaining to U.S. EPA's remedy selection have been included in the Administrative Record.

11. Comment: The community of Griffith, Indiana has already informed the Agency that it does not want an incinerator in its town. The U.S. EPA ignores that opposition in selecting the remedy.

Response: Low-Temperature Thermal Treatment is not incineration. Incineration operates at much higher temperatures and actually destroys most contaminants and the contaminant matrix, whereas LTTT removes most contaminants from the contaminant matrix, allowing reuse of this matrix onsite. Many of these contaminants will then be sent offsite. Comments received from residents generally reflect a desire to clean-up the ACS site in an expedient manner.

7. Comments from Andrew Perellis, representing ACS RD/RA Organizational Group.

1. Comment: The PRPs object to any ROD that specifies clean-up standards, particularly health-based standards, where U.S. EPA does not first propose specific standards for review and comment.

Response: Please see the response to Comment # 1, Section III.B.1, of this responsiveness summary.

2. Comment: The PRPs object to the U.S. EPA's selection of clean-up standards unrelated to the capabilities of the technology selected for remediation at the site.

Response: Please see the response to Comment # 6, Section III.B.1., of this responsiveness summary.

3. Comment: The U.S. EPA, without any legal basis, completely disregards the applicability of both the LDR and LDR treatability variance standards established by its own guidance.

Response: Please see the response to Comment # 9, Section III.B.6., of this responsiveness summary.

4. Comment: The PRPs object to the issuance of a ROD at this time because U.S. EPA's approach to dealing with contaminated soils and risk are in a state of flux.

Response: Please see the response to Comment # 12, Section III.B.1., of this responsiveness summary.

5. Comment: There are no documents in the Administrative Record to suggest that the State of Indiana submitted any ARARs, as required by the NCP, or that the State supports the remedy.

Response: Please see the response to Comment # 10, Section III.B.6., of this responsiveness summary.

6. Comment: Indiana currently has a statute which bans the incineration of PCBs in the State.

Response: Please see the response to Comment # 3, Section III.B.2., of this responsiveness summary.

7. Comment: All documents reflecting the decision U.S. EPA made on rejecting the PRPs ecological assessment should be included in the administrative record.

Response: All documents reflecting the decision U.S. EPA made on rejecting the PRP's ecological assessment are included in the administrative record.

8. Comments from William J. Anaya, representing Alumax

1. Comment: Issues affecting the liability of customers of ACS after 1975 need to be further addressed by U.S. EPA. There are data gaps in the administrative record regarding past site operations, the exact quantities of wastes which were disposed of , the processes used by ACS, the business practices of ACS, and the dates when disposal occurred. Similar information is also lacking in the administrative record regarding Kapica Drum. This information is relevant for various parties to determine their liability and to provide a basis for remedial action. The information would be particularly useful to encourage a voluntary cleanup of all parties.

Response: U.S. EPA encourages PRPs to enter into negotiations to voluntarily conduct a cleanup of the ACS site. While certain parties may have concerns over their liability for cleaning the site, the purpose of the administrative record is to present documents that form the basis for the selection of the response action at the site. Information regarding the liability of a particular group of parties is not necessarily relevant to the selection of the response action. Documents in the administrative record, however, which do contain information regarding the history of the site and processes used at the site include the remedial investigation, feasibility study, and the information request response of ACS. Extensive data is included in the RI/FS documenting the nature and extent of contaminants which are present at the site and which need to be remediated.

APPENDIX B

STATEMENT OF WORK FOR THE REMEDIAL DESIGN AND REMEDIAL ACTION AT AMERICAN CHEMICAL SERVICES SITE LAKE COUNTY GRIFFITH, INDIANA

I. PURPOSE

The purpose of this Statement of Work (SOW) is to set forth requirements for implementation of the remedial action set forth in the Record of Decision (ROD), which was signed by the Regional Administrator of U.S. EPA Region V on September 30, 1992, for the American Chemical Services (ACS) Site (Site). The Settling Defendants shall follow the ROD, the SOW, the approved Pre-Design Work Plan, the approved Remedial Design Work Plan, the approved Remedial Action Work Plan, U.S. EPA Superfund Remedial Design and Remedial Action Guidance and any additional guidance specified by U.S. EPA in submitting deliverables for designing and implementing the remedial action at the ACS Site.

II. DESCRIPTION OF THE SITE, REMEDIAL ACTION, AND PERFORMANCE STANDARDS

ACS is located at 420 S. Colfax Ave., Griffith, Indiana, and includes ACS property (19 acres), Pazmey Corp. property (formerly Kapica Drum, Inc, now owned by Darija Djurovic.; two acres) and the inactive portion of the Griffith Municipal Landfill (approximately 15 acres). The ACS Superfund Site includes all these properties (Figure 1). The site is bordered on the east and northeast by Colfax Avenue. The Chesapeake and Ohio railway bisects the site in a northwest-southeast direction, between the fenced On-site Area (north) and the Off-site Area (south). On the west and northwest, south of the Chesapeake and Ohio railway, the site is bordered by the abandoned Erie and Lackawanna railway and the active portion of the Griffith Municipal Landfill. North of the Chesapeake and Ohio railway, the site is bordered on the west by wetland areas. The northern boundary of the site is formed by the Grand Trunk railway. Surface water runoff is generally to the west and south. Surface water runoff appears to be confined to the site by drainage to the wetlands and subsequent infiltration. There appears to be no direct connection between site surface water drainage and local streams, however, ground water does discharge to the wetlands and the wetlands are ultimately drained by Turkey Creek, approximately 1 1/2 miles south of the site. Developed land around the site is used for single family residences and industrial purposes.

Settling Defendants shall design and implement the Remedial Action to meet the performance standards and specifications set forth in the ROD and this SOW. Performance standards shall include cleanup standards, standards of control, quality criteria and other substantive requirements, criteria or limitations including all

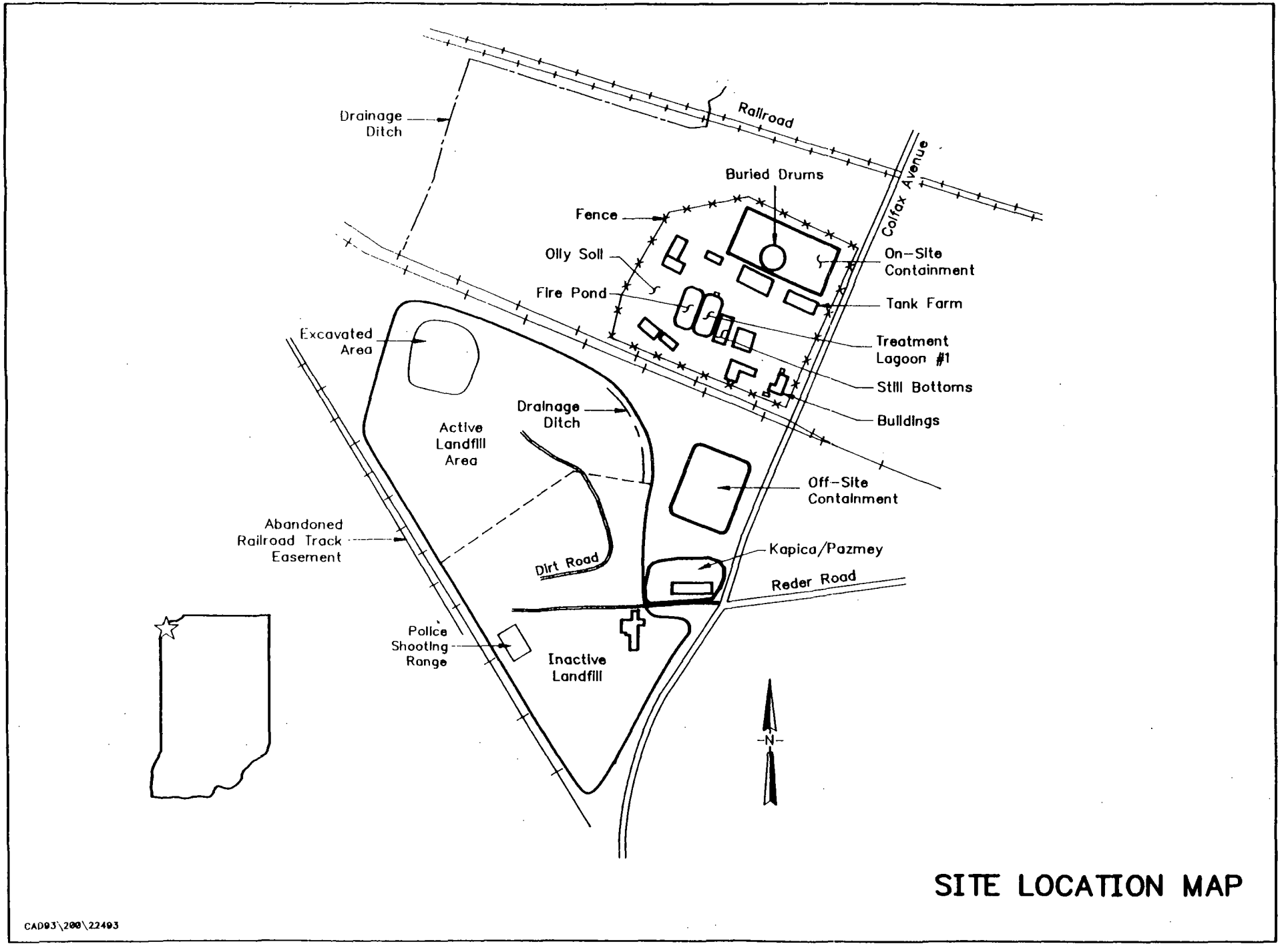
Drainage Ditch
Railroad
Buried Drums
Colfax Avenue
Fence
Olly Soil
On-Site Containment
Fire Pond
Tank Farm
Excavated Area
Treatment Lagoon #1
Still Bottoms
Drainage Ditch
Buildings
Active Landfill Area
Off-Site Containment
Abandoned Railroad Track Easement
Kapica/Pazmey
Dirt Road
Reder Road
Police Shooting Range
Inactive Landfill
N
SITE LOCATION MAP
CAD93\200\22493

FIGURE 1

Applicable or Relevant and Appropriate Requirements (ARARs) set forth in the ROD, SOW and/or Consent Decree. Cleanup Standards have been set for the site based on the risk assessment developed for the Site, U.S. EPA's Risk Assessment Guidance for Superfund (RAGS), and Federal, State, and local regulations.

The major components of the selected remedial action include:

- Ground water pumping and treatment system to dewater the site and to contain the contaminant plume with subsequent discharge of the treated ground water to surface water and wetlands;

- Excavation of approximately 400 drums in the On-site Containment Area for offsite incineration;

- Excavation of buried waste materials/Source Areas (as defined in the ROD and this SOW) and treatment by low-temperature thermal treatment (LTTT). Treatment residuals meeting performance standards will be re-deposited on-site.

- On-site treatment or off-site disposal of treatment condensate;

- Vapor emission control during excavation and possible immobilization of inorganic contaminants after LTTT;

- Off-site disposal of miscellaneous debris;

- In-situ vapor extraction pilot study of buried waste in On-site Area;

- In-situ vapor extraction of contaminated soils;

- Continued evaluation and monitoring of wetlands and, if necessary, remediation;

- Long term ground-water monitoring;

- Fencing the site and possible implementation of deed and access restrictions and deed notices; and

- Private well sampling with possible well closures or ground water use advisories.

A. Site Security

The Settling Defendants shall install and maintain a fence at the Site to prevent access and vandalism to the Site. Fencing of the Site shall consist of a chain link fence around the perimeter which is a minimum six-feet high with a minimum three-strand barbed wire. The fence shall border, at a minimum, the ACS site as shown in

Figure 1. The exact location of the fence will be identified in the pre-design work plan and approved by U.S. EPA. Warning signs shall be posted at 200-foot intervals along the fence and at all gates. The warning signs shall advise that the area is hazardous due to chemicals in the soils which pose a risk to public health through direct contact. The signs shall also provide a telephone number to call for further information. The fence shall be completed as part of pre-design activities.

B. Restrictive Covenants/Deed Restrictions

Within 15 days after the entry of this Consent Decree, Settling Defendants shall execute and record with the Lake County recorder restrictive covenants to ensure that, except for construction required by this SOW, no construction or installation of drinking water wells occurs on-site which may increase the likelihood of exposure to remaining contaminants; and to ensure that there is no interference with the operation and maintenance of treatment and monitoring systems required by this remedial action. Settling defendants shall exercise their best efforts to implement these deed and access restrictions.

C. Identification of contaminated ground water

Settling Defendants shall perform sufficient additional sampling to identify the horizontal and vertical extent of ground water contamination in order to access the degree of off-site contaminant migration and to design an effective ground water treatment system.

D. Identification of buried waste and contaminated soils for Low-Temperature Thermal Treatment (LTTT) and In-situ Vapor Extraction (ISVE)

Settling Defendants shall fully identify the horizontal and vertical extent of buried waste and soils contaminated at levels exceeding any of the Cleanup Standards described in the ROD. These Cleanup Standards are listed in Appendix A. Settling Defendants may utilize a procedure which uses:

1. Field screening for identification and delineation of source areas to be excavated;

2. Remedial investigation data to approximately locate treatment systems; and

3. Confirmational sampling and analysis after excavation of source areas to be treated by LTTT and after ISVE soil treatment to verify removal of all contaminates exceeding

Regardless of the pilot study results, LTTT will be implemented and completed for buried wastes in the Off-site Area. U.S. EPA and the State have determined that an in-situ technology (i.e. ISVE) is not appropriate for the Off-site Area due to the large number and random distribution of buried drums. However, additional pilot scale testing on other innovative technologies may be conducted providing such testing does not delay the current remediation schedule involving LTTT.

4. Treatment of Contaminated Soils

The Settling Defendants shall treat all soil that contains hazardous substances, pollutants or contaminants that exceed the performance standards outlined in Appendix A. Settling Defendants shall perform treatability tests designed to determine if ISVE can achieve remediation levels set forth in Appendix A. If it is determined by U.S. EPA, after consultation with the State, through treatability testing that performance standards cannot be met by the ISVE technology then contaminated soil will be excavated, treated by LTTT to performance standards, and redeposited. The Settling Defendants shall manage condensate from the treatment process in accordance with the approved design. Air emissions from the LTTT system shall not exceed the standards set forth in Section II.F.3.

During the course of the ISVE implementation, if either the Settling Defendants or U.S. EPA, after reasonable opportunity for review and comment by the State, determine that the removal of contaminants can be enhanced by pulsing either the entire ISVE system or individual wells, U.S. EPA may, at its option, require the Settling Defendants to operate the system in that manner.

During the first six months after initiating the full-scale ISVE system, the Settling Defendants shall perform a Feasibility Test to examine the efficacy of adding essential nutrients (e.g., moisture, nitrogen, and phosphate) as part of the ISVE system to enhance the natural microbial degradation of organic compounds. The Feasibility Test shall be subject to the supervision and review of the U.S. EPA and the State. The objective of the Feasibility Test is to determine the optimum amounts of nutrients to be added to the soils in order to promote the natural microbial activities, without decreasing the effectiveness of the removal of contaminants by ISVE. At the conclusion of the Feasibility Test period, the Settling Defendants shall present the results of this study to the U.S. EPA and the State in the form of a written report. The underlying data developed during the Feasibility Test shall be made available to the U.S. EPA and the State upon request. Based on the results of the Feasibility Test, U.S.

EPA, after reasonable opportunity for review and comment by the State, may require the Settling Defendants to implement the addition of essential nutrients to the soils.

The Settling Defendants shall describe the method of conducting the Feasibility Test in the Remedial Design Work Plan.

5. Treatability Testing

Treatability testing for LTTT and ISVE shall be performed during the pre-design task outlined in Section III of this SOW (Task 1). Specific treatability test procedures shall be outlined in the Pre-Design Work Plan.

Settling Defendants shall perform treatability tests designed to determine LTTT operating parameters needed to achieve the cleanup levels set forth in Appendix A. Settling Defendants may only use LTTT units having the ability to remove PCBs to levels meeting the PCB Cleanup Standard, and shall provide to U.S. EPA and the State data demonstrating that ability. If U.S. EPA, after reasonable opportunity for review and comment by the State, determines that the treatability tests show that the performance standards can be achieved by LTTT, Settling Defendants shall design, construct, and operate an LTTT system. The LTTT system shall not be demobilized until U.S. EPA, after reasonable opportunity for review and comment by the State, determines that all material is treated by LTTT as required by this remedy.

Settling defendants shall also perform treatability tests to determine whether ISVE of contaminated soils can achieve the performance standards in Appendix A. If U.S. EPA, after reasonable opportunity for review and comment by the State, determines that the treatability tests show that the performance standards can be achieved by ISVE, Settling Defendants shall design, construct, and operate an ISVE system. If U.S. EPA, after reasonable opportunity for review and comment by the State, determines that the treatability tests show that contaminated soils cannot be remediated to performance standards by ISVE, then Settling Defendants shall treat contaminated soils by LTTT.

F. <u>Installation and Operation of Monitoring Program for Remedial Action</u>

Settling Defendants shall implement monitoring program(s) to:

- immediately assess completed exposure pathways to upper and lower aquifer contaminants to assess the need for

residential well closures or ground water use advisories;

- assess the need for air emission controls during excavation activities; and

- evaluate and ensure that the construction and implementation of the Remedial Action comply with approved plans and the approved design and performance standards.

Settling Defendants shall submit monitoring programs as part of the Pre-Design Work Plan and the Remedial Design Work Plan, which shall address the specific components of the remedial action identified in the ROD and this SOW. Each sample shall be analyzed for a list of parameters approved by U.S. EPA, after reasonable opportunity for review and comment by the State.

1. Residential well monitoring

The Settling Defendants shall implement a residential well monitoring program as identified in the Pre-Design Work Plan or as required by U.S. EPA, after reasonable opportunity for review and comment by the State. The Settling Defendants shall design a residential well monitoring program for both upper and lower aquifer wells capable of evaluating potential exposure to contaminated ground water for all nearby residents. The monitoring program shall specify the frequency, duration, and compounds to be analyzed. The program shall include a contingency plan for well closure and ground water use advisories if those are determined by U.S. EPA, in consultation with the State, to be necessary.

2. Groundwater Monitoring

The Settling Defendants shall implement a groundwater monitoring program as identified in the RD Work Plan or as required by U.S. EPA. The Settling Defendants shall design a groundwater monitoring program to detect changes in the chemical concentration of the groundwater at and adjacent to the site.

Upon lodging of the Consent Decree, Settling Defendants shall sample the monitoring wells identified by U.S. EPA, after reasonable opportunity for review and comment by the State, (and those subsequently included in the approved RD Work Plan) on a quarterly basis, and analyze the samples for the parameters listed in Appendix B.

During construction of the groundwater treatment system, the Settling Defendants shall sample and analyze ground water on a quarterly basis, at the locations identified in RD Work Plan

and analyze for the sampling parameters listed in Appendix B. Analysis shall be sent to U.S. EPA and the State.
After construction of the groundwater treatment system, Settling Defendants shall continue sampling and analysis of groundwater at and adjacent to the Site for a minimum of 30 years at the locations identified in the RD Work Plan and analyze for the sampling parameters listed in Appendix B to ensure continued attainment of performance standards. If performance standards are not maintained Settling Defendants shall renew pumping of the ground water to the ground water treatment system until it is demonstrated that none of the contaminants exceed any performance standard in any of the wells in the monitoring network for a period of three years. At that time, Settling Defendants shall begin monitoring the site, as described above, for a minimum of 30 years.

If additional information indicates that the groundwater monitoring program is inadequate, U.S. EPA, after reasonable opportunity for review and comment by the State, may require additional groundwater monitoring wells and laboratory analysis of additional parameters.

3. Air Monitoring

At all times during the performance of the Remedial Action, Settling Defendants shall ensure that air emissions from treatment units and excavation activities do not exceed a cumulative cancer risk of 1 x 10-5 for any receptor, using risk calculation methods set forth in Risk Assessment Guidance for Superfund. In addition, the air emissions shall not exceed any ARARs. If air emissions exceed these levels, Settling Defendants shall take corrective measures immediately, as defined in the RD Work Plan. The Settling Defendants shall submit, as part of the RD Work Plan, an air emission monitoring program, specifying the frequency, duration, and compounds to be analyzed. Such program shall be subject to approval by the U.S. EPA, in consultation with the State. Residuals from air emissions control processes shall be treated and/or disposed of off-site.

4. Extraction/Treatment System Monitoring

The Settling Defendants shall initiate a monitoring program for the Ground water extraction/treatment system as identified in the RD Work Plan or as required by U.S. EPA, after reasonable opportunity for review and comment by the State. The monitoring program shall be designed to detect any conditions that may interfere with the proper operation and function of the system. System monitoring shall include collection and field/laboratory analysis of effluent samples

to determine the effectiveness of the treatment system. Sampling shall occur on a weekly basis, for a period of 8 weeks. Once the remedial action is determined to be both operational and functional, the Settling Defendants shall follow the sampling procedures and frequencies established in the RD/RA Workplan.

5. Points of Compliance

In order to monitor and evaluate the remedial actions throughout the Site, certain locations at which there are groundwater monitoring wells shall be selected as points of compliance. Wells designated as representing the Points of Compliance, and which shall be sampled shall be identified in the Pre-Design Work Plan. All these wells shall be considered as groundwater points of compliance. The wells shall be grouped into wells for detection monitoring and wells for compliance monitoring. If any of the wells in any way become unusable, the Settling Defendants shall repair or replace each well. Additional wells may be required by U.S. EPA, after reasonable opportunity for review and comment by the State, during the development of the RD/RA Work Plan and the Operation and Maintenance (O&M) Plan. The location of any additional wells installed pursuant to the Consent Decree or this SOW shall be approved by the U.S. EPA, after reasonable opportunity for review and comment by the State. Detection monitoring shall be conducted in accordance with this SOW, and consistent with the Consent Decree. Compliance monitoring shall be conducted in accordance with this SOW, and consistent with the Consent Decree.

III. SCOPE OF REMEDIAL DESIGN AND REMEDIAL ACTION

The Remedial Design/Remedial Action shall consist of seven tasks. All plans are subject to EPA approval.

Task 1: Pre-Design Work Plan

Task 2: Remedial Design Work Plan

Task 3: Remedial Design Phases

A. Preliminary Design
B. Intermediate Design
C. Prefinal Design/ Final Design

Task 4: Remedial Action Work Plan

Task 5: Remedial Action/Construction

A. Preconstruction Meeting

B. Prefinal Inspection
C. Final Inspection
D. Reports

1. Final Construction Report
2. Completion of Remedial Action Report
3. Completion of Work Report

Task 6: Operation and Maintenance

Task 7: Performance Monitoring

Task 1: Pre-Design Work Plan

The Settling Defendants shall submit a Pre-Design Work Plan that shall document the overall management strategy for performing pre-design studies to supplement the available technical data and to provide information necessary to fully implement the Remedial Design and Remedial Action. The Settling Defendants shall implement the pre-design work in accordance with the final Pre-Design Work Plan. This pre-design work plan shall include, at a minimum:

- Perimeter fence installation;
- Excavation and offsite disposal plan for intact buried drums in the On-site Containment Area;
- Investigations in the wetlands;
- Identification of compliance and detection monitoring wells;
- Residential well sampling to immediately assess completed exposure pathways to upper and lower aquifer contaminants and the need for well closures or ground water use advisories;
- An ISVE pilot study for On-site Area buried wastes;
- Treatability studies for LTTT and ISVE effectiveness on buried wastes and contaminated soils;
- Refining lead cleanup levels using the Biokinetic Uptake Model; and
- Provisions for any other testing needed for pre-design purposes.

The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation of the remedy and shall include a description

of qualifications of key personnel directing the Remedial Design, including contractor personnel. The Work Plan shall also contain a schedule of Pre-Design activities.

This Pre-Design Work Plan shall include, at a minimum, a pre-design Quality Assurance Project Plan (QAPP), Health and Safety Plan, Field Sampling Plan and schedule to delineate the extent of contamination in the wetlands.

All principal personnel involved in the development of the work plan for pre-design studies shall meet with U.S. EPA and State representatives prior to submitting this work plan in order to discuss program elements including objectives, resources, communication channels, and roles.

At the direction of the U.S. EPA, after reasonable opportunity for review and comment by the State, Settling Defendants shall furnish all services for any such studies required, including field work, materials, supplies, labor, equipment, and data interpretation. Sufficient sampling, testing and analysis shall be performed to optimize the required treatment and/or disposal operations and systems.

Settling Defendants shall submit to U.S. EPA and the State a final pre-design report which includes the results of all pre-design studies, recommendations based on results of the studies, and all data collected during the studies.

Task 2: Remedial Design Work Plan

The Settling Defendants shall submit a Work Plan which shall document the overall management strategy for performing the design, construction, operation, maintenance and monitoring of Remedial Actions for U.S. EPA review and approval. The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation and shall include a description of qualifications of key personnel directing the Remedial Design, including contractor personnel. The Work Plan shall also contain a schedule of Remedial Design activities. The Settling Defendants shall submit a Remedial Design Work Plan in accordance with § XII and paragraph 11 of the Consent Decree and Section V of this SOW. This RD Work Plan shall include, at a minimum, a design QAPP, Health and Safety Plan, and Field Sampling Plan.

Task 3: Remedial Design Phases

Settling Defendants shall prepare construction plans and specifications to implement the Remedial Actions at the Site as described in the ROD and this SOW. Plans and

specifications shall be submitted in accordance with the schedule set forth in Section V below. Subject to approval by U.S. EPA, after reasonable opportunity for review and comment by the State, Settling Defendants may submit more than one set of design submittals reflecting different components of the Remedial Action. All plans and specifications shall be developed in accordance with U.S. EPA's Superfund Remedial Design and Remedial Action Guidance (OSWER Directive No. 9355.0-4A) and shall be developed to ensure that the Remedial Action shall meet all objectives of the ROD , the CD and this SOW, including all performance standards. Settling Defendants shall meet regularly with U.S. EPA and the State to discuss design issues.

A. Preliminary Design

Settling Defendants shall submit the Preliminary Design when the design effort is approximately 30 % complete. The Preliminary Design submittal shall include or discuss, at a minimum, the following:

- Preliminary plans, drawings, and sketches, including design calculations;
- Results of treatability studies and additional field sampling;
- Design assumptions and parameters, including design restrictions, process performance criteria, appropriate unit processes for the treatment train, and expected removal or treatment efficiencies for both the process and waste (concentration and volume);
- Proposed cleanup verification methods, including compliance with Applicable or Relevant and Appropriate Requirements (ARARs);
- Outline of required specifications;
- Proposed siting/locations of processes/construction activity;
- Expected long-term monitoring and operation requirements;
- Real estate, easement, and permit requirements;
- Preliminary construction schedule, including contracting strategy.

B. Intermediate Design

Settling Defendants shall submit the Intermediate Design when the design effort is approximately 60 % complete. The Intermediate Design shall fully address all comments made to the preceding design submittal. The Intermediate Design submittal shall include those elements listed for the Preliminary Design, as well as, the following:

- Draft Performance Standard Verification Plan;
- Draft Construction Quality Assurance Plan;
- Draft QAPP, Draft Health and Safety Plan, Draft Field Sampling Plan, Draft Contingency Plan

C. Prefinal and Final Designs

Settling Defendants shall submit the Prefinal Design when the design effort is 95% complete and shall submit the Final Design when the design effort is 100% complete. The Prefinal Design shall fully address all comments made to the preceding design submittal. The Final Design shall fully address all comments made to the Prefinal Design and shall include reproducible drawings and specifications suitable for bid advertisement. The Prefinal Design shall serve as the Final Design if U.S. EPA has no further comments and issues the notice to proceed.

The Prefinal and Final Design submittals shall include those elements listed for the Preliminary Design, as well as, the following:

- Final Performance Standard Verification Plan;
- Final Construction Quality Assurance Plan;
- Final QAPP, Final Health and Safety Plan, Final Field Sampling Plan, Final Contingency Plan;
- Draft Operation and Maintenance Plan;
- Capital and Operation and Maintenance Cost Estimate. This cost estimate shall refine the FS cost estimate to reflect the detail presented in the Final Design;
- Final Project Schedule for the construction and implementation of the Remedial Action which identifies timing for initiation and completion of all critical path tasks. The final project schedule submitted as part of the Final Design shall include specific dates for completion of the project and major milestones.

Chromium (VI)	1,400 - 47	HI	NA	1.0-0.03
Naphthalene	82 - 3	HI	NA	1.0-0.03
Nitrogenated Benzenes	6.2 - 0.2	HI	NA	1.0-0.03
n-Chain Alkanes	760 - 25	HI	NA	1.0-0.03
1,1,1-Trichloro-ethane	2,300 - 77	HI	NA	1.0-0.03
Branched Alkanes	770 - 26	HI	NA	1.0-0.03
4-Methyl-2-pentanone	630 - 21	HI	NA	1.0-0.03
Methyl Proply Benzenes	490 - 16	HI	NA	1.0-0.03
Halogentaed Alkanes	2,300 - 77	HI	NA	1.0-0.03
Endosulfan I	0.63 - 0.02	HI	NA	1.0-0.03
Dimethyl Ethyl Benzenes	1,300 - 43	HI	NA	1.0-0.03
1,2-Dichloroethene (cis)	250 - 8.3	HI	NA	1.0-0.03
2-Butanone	620 - 21	HI	NA	1.0-0.03
Non-Cyclic Acids	1,000 - 33	HI	NA	1.0-0.03
Methylated Naphthalenes	85 - 3	HI	NA	1.0-0.03

Acetone	2,400 - 80	HI	NA	1.0-0.03
Chlorobenzene	150 - 5	HI	NA	1.0-0.03
Xylenes (mixed)	26,000 - 867	HI	NA	1.0-0.03
Oxygenated Benzenes	1,200 - 40	HI	NA	1.0-0.03
Diethyl Benzenes	1,300 - 43	HI	NA	1.0-0.03
Propenyl Benzenes	320 - 11	HI	NA	1.0-0.03
Di-n-butylphthalate	2,300 - 77	HI	NA	1.0-0.03
Ethyl Methyl Benzenes	4,900 - 163	HI	NA	1.0-0.03
1,2,4-Trichloro benzene	16 - 0.5	HI	NA	1.0-0.03
Chloroethane	2700 - 90	HI	NA	1.0-0.03

APPENDIX B

Final Remediation Levels from ROD			Corresponding Risk	
Chemical	Remediation Level ug/L	Basis	Cancer	NonCancer
Benzene	5.0	MCL	6.5E-07	NA
Vinyl Chloride	0.25	Risk	1.0E-06	NA
PCBs	0.06	Risk	1.0E-06	NA
bis(2-Chloro-ethyl)ether	21.0	Risk	1.0E-06	NA
Arsenic	8.8	Risk	1.0E-06	<.01
PCE	5.0	MCL	6.2E-07	NA
Methylene Chloride	5.0	MCL	5.4E-07	NA
Chloromethane	8.4	Risk	1.0E-06	NA
Beryllium	0.02	Risk	1.0E-06	NA
Trichloroethene	5.0	MCL	2.1E-07	NA
bis(2-Ethylhexyl) phthalate	5.8	Risk	1.0E-06	NA
Cyclic Ketones	5.8	Risk	1.0E-06	NA
Pentachlorophenol	1.0	MCL	1.5E-06	NA
1,4-Dichlorobenzene	3.3	Risk	1.0E-06	NA
Isophorone	19	Risk	1.0E-06	NA
2-Butanone	24,000 - 2,000	HI	NA	1.0-0.08
4-Methyl-2-pentanone	640 - 53	HI	NA	1.0-0.08
Non-Cyclic Acids	280 - 23	HI	NA	1.0-0.08
Acetone	2,300 - 192	HI	NA	1.0-0.08
Branched Alkanes	210 - 18	HI	NA	1.0-0.08

Ethylbenzene	390 - 33	HI	NA	1.0-0.08
Thallium	2.4 - 0.2	HI	NA	1.0-0.08
Dimethyl Ethyl Benzenes	250 - 21	HI	NA	1.0-0.08
1,2-Dichloroethene (cis)	330 - 28	HI	NA	1.0-0.08
Manganese	3,300 - 275	HI	NA	1.0-0.08
4-Methylphenol	1,700 - 142	HI	NA	1.0-0.08
1,1-Dichloroethane	2,200 - 183	HI	NA	1.0-0.08

APPENDIX C

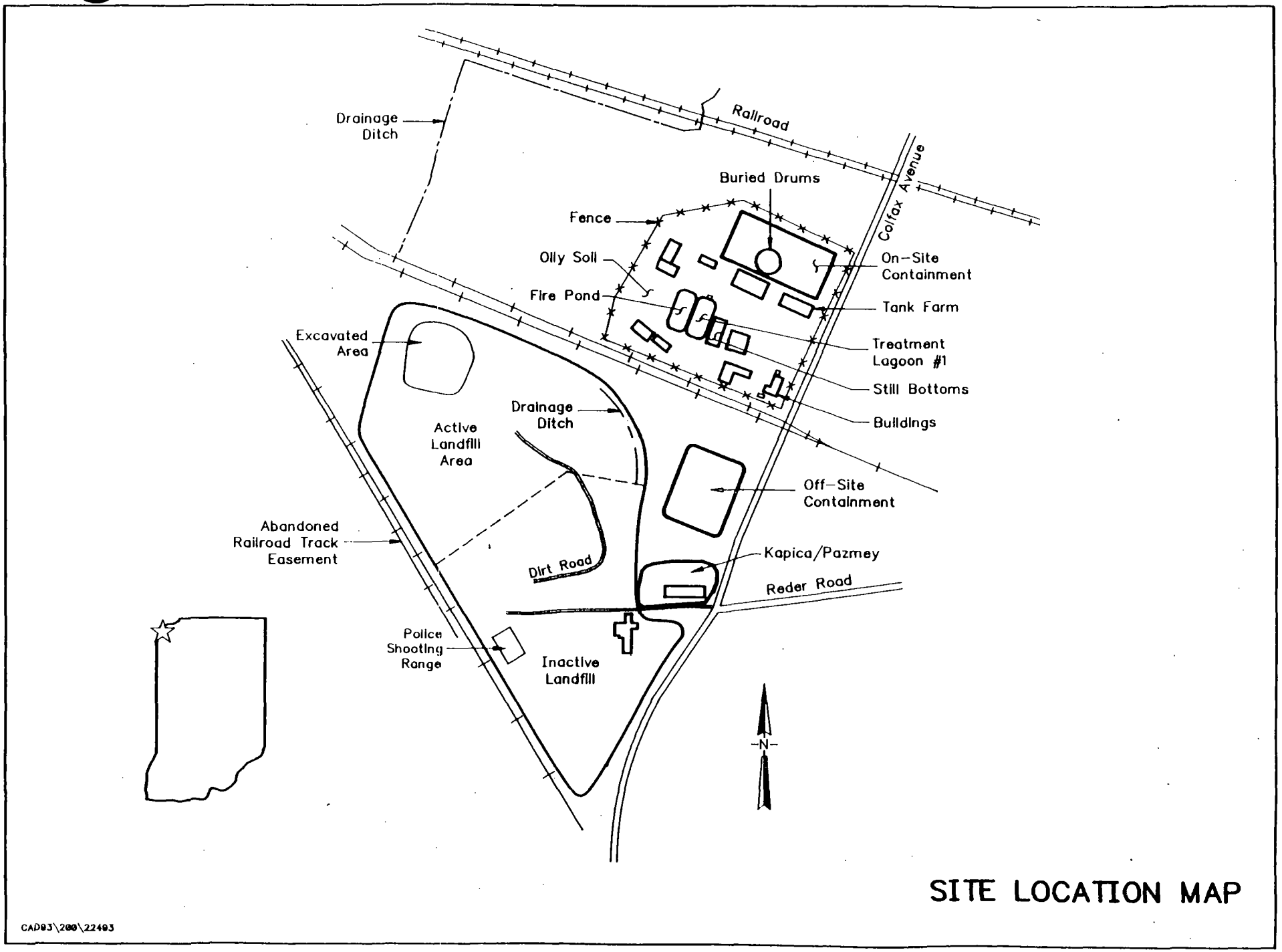
Drainage Ditch
Railroad
Colfax Avenue
Buried Drums
Fence
Olly Soil
Fire Pond
On-Site Containment
Tank Farm
Treatment Lagoon #1
Still Bottoms
Buildings
Excavated Area
Active Landfill Area
Drainage Ditch
Off-Site Containment
Abandoned Railroad Track Easement
Dirt Road
Kapica/Pazmey
Reder Road
Police Shooting Range
Inactive Landfill
N
SITE LOCATION MAP
CAD93\200\22493

FIGURE 1

APPENDIX D

APPENDIX E

Task 4: Remedial Action Work Plan

The Settling Defendants shall submit a Remedial Action Work Plan which includes a detailed description of the remediation and construction activities. The RA Work Plan shall include a project schedule for each major activity and submission of deliverables generated during the Remedial Action. The Settling Defendants shall submit a Remedial Action Work Plan in accordance with § XII and paragraph 12 of the Consent Decree and Section V of this SOW.

Task 5: Remedial Action Construction

The Settling Defendants shall implement the Remedial Action as detailed in the approved Final Design. The following activities shall be completed in constructing the Remedial Action.

A. Preconstruction inspection and meeting:

The Settling Defendants shall participate with the U.S. EPA and the State in a preconstruction inspection and meeting to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security and safety protocol;

d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and,

e. Conduct a Site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and meeting shall be documented by a designated person and minutes shall be transmitted to all parties.

B. Prefinal inspection:

Within 15 days after Settling Defendants make a preliminary determination that construction is complete, the Settling Defendants shall notify the U.S. EPA and the State for the purposes of conducting a prefinal inspection. The prefinal inspection shall consist of a walk-through inspection of the

entire Facility with U.S. EPA and the State. The inspection is to determine whether the project is complete and consistent with the contract documents and the Remedial Action. Any outstanding construction items discovered during the inspection shall be identified and noted. Additionally, treatment equipment shall be operationally tested by the Settling Defendants. The Settling Defendants shall certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. The prefinal inspection report shall outline the outstanding construction items, actions required to resolve items, completion date for these items, and a proposed date for final inspection.

C. Final inspection:

Within 15 days after completion of any work identified in the prefinal inspection report, the Settling Defendants shall notify the U.S. EPA and the State for the purposes of conducting a final inspection. The final inspection shall consist of a walk-through inspection of the Facility by U.S. EPA, the State, and the Settling Defendants. The prefinal inspection report shall be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

D. Reports

1. Final Construction Report

This report shall be submitted by the Settling Defendants when construction is complete, but performance standards have not yet been attained.

Within 30 days of a successful final inspection, Settling Defendants shall submit a Construction Completion Report. In the report, a registered professional engineer and the Settling Defendants' Project Coordinator shall state that the Remedial Action has been constructed in accordance with the design and specifications. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

2. Completion of Remedial Action Report

This report shall be submitted by the Settling Defendants when construction is complete and performance standards have been attained and where O&M requirements will continue to be performed.

Within 30 days of a successful final inspection, Settling Defendants shall submit a Completion of Remedial Action Report. In the report, a registered professional engineer and the Settling Defendants' Project Coordinator shall state the Remedial Action has been completed in full satisfaction of the requirements of this Consent Decree. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

3. Completion of Work Report

This report shall be submitted by the Settling Defendants when construction is complete, performance standards have been attained and O & M is complete or not required.

Within 30 days of a successful final inspection, Settling Defendants shall submit a Completion of Work Report. In the report, a registered professional engineer and the Settling Defendants' Project Coordinator shall state that all work, including O & M, has been completed in full satisfaction of the requirements of this Consent Decree. The written report shall include as-built drawings signed and stamped by a professional engineer not previously submitted. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Task 6: Operation and Maintenance

The Settling Defendants shall prepare an Operation and Maintenance (O&M) Plan to cover both implementation and long term maintenance of the Remedial Actions. An initial Draft O&M Plan shall be submitted as a final Design Document submission. The final O&M Plan shall be submitted to U.S. EPA and the State prior to the pre-final construction inspection, in accordance with the approved construction schedule. The plan shall be composed of the following elements:

1. Description of normal operation and maintenance;

    a. Description of tasks for operation;
    b. Description of tasks for maintenance;
    c. Description of prescribed treatment or operation conditions; and
    d. Schedule showing frequency of each O&M task.

2. Description of potential operating problems;

    a. Description and analysis of potential operation problems;
    b. Sources of information regarding problems; and
    c. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing;

    a. Description of monitoring tasks;
    b. Description of required data collection, laboratory tests and their interpretation;
    c. Required quality assurance, and quality control;
    d. Schedule of monitoring frequency and procedures for a petition to U.S. EPA and the State to reduce the frequency of or discontinue monitoring; and
    e. Description of verification sampling procedures if Cleanup or Performance Standards are exceeded in routine monitoring.

4. Description of alternate O&M;

    a. Should systems fail, alternate procedures to prevent release or threatened releases of hazardous substances, pollutants or contaminants which may endanger public health and the environment or exceed performance standards; and
    b. Analysis of vulnerability and additional resource requirements should a failure occur.

5. Corrective Action;

   a. Description of corrective action to be implemented in the event that cleanup or performance standards are exceeded; and
   b. Schedule for implementing these corrective actions.

6. Safety plan;

   a. Description of precautions, of necessary equipment, etc., for Site personnel; and
   b. Safety tasks required in the event of systems failure.

7. Description of equipment; and

   a. Equipment identification;
   b. Installation of monitoring components;
   c. Maintenance of Site equipment; and
   d. Replacement schedule for equipment and installed components.

8. Records and reporting mechanisms required.

   a. Daily operating logs;
   b. Laboratory records;
   c. Records for operating costs;
   d. Mechanism for reporting emergencies;
   e. Personnel and maintenance records; and
   f. Monthly/annual reports to State agencies.

Task 7: Performance Monitoring

Performance monitoring shall be conducted to ensure that all Performance Standards are met.

A. Performance Standard Verification Plan

The purpose of the Performance Standard Verification Plan is to provide a mechanism to ensure that both short-term and long-term Performance Standards for the Remedial Action are met. The Draft Performance Standards Verification Plan shall be submitted with the Intermediate Design. Once approved, the Performance Standards Verification Plan shall be implemented on the approved schedule. The Performance Standards Verification Plan shall include:

1. Quality Assurance Project Plan
2. Health and Safety Plan
3. Field Sampling Plan

IV CONTENT OF SUPPORTING PLANS

The documents listed in this section -- the Quality Assurance Project Plan, the Field Sampling Plan, the Health and Safety Plan, the Contingency Plan and the Construction Quality Assurance Plan -- are documents which must be prepared and submitted as outlined in Section III of this SOW. The following section describes the required contents of each of these supporting plans.

A. Quality Assurance Project Plan

The Settling Defendants shall develop a Site specific Quality Assurance Project Plan (QAPP), covering sample analysis and data handling for samples collected in all phases of future Site work, based upon the Consent Decree and guidance provided by U.S. EPA and the State. The QAPP shall be consistent with the requirements of the EPA Contract Lab Program (CLP) for laboratories proposed outside the CLP. The QAPP shall at a minimum include:

1. Project Description

- Facility Location History
- Past Data Collection Activity
- Project Scope
- Sample Network Design
- Parameters to be Tested and Frequency
- Project Schedule

Project Organization and Responsibility

Quality Assurance Objective for Measurement Data

- Level of Quality Control Effort
- Accuracy, Precision and Sensitivity of Analysis
- Completeness, Representativeness and Comparability

Sampling Procedures

Sample Custody

- Field Specific Custody Procedures
- Laboratory Chain of Custody Procedures

Calibration Procedures and Frequency

- Field Instruments/Equipment
- Laboratory Instruments

Analytical Procedures

- Non-Contract Laboratory Program Analytical Methods
- Field Screening and Analytical Protocol
- Laboratory Procedures

Internal Quality Control Checks

- Field Measurements
- Laboratory Analysis

Data Reduction, Validation, and Reporting

- Data Reduction
- Data Validation
- Data Reporting

Performance and System Audits

- Internal Audits of Field Activity
- Internal Laboratory Audit
- External Field Audit
- External Laboratory Audit

Preventive Maintenance

- Routine Preventative Maintenance Procedures and Schedules
- Field Instruments/Equipment
- Laboratory Instruments

Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness

- Field Measurement Data
- Laboratory Data

Corrective Action

- Sample Collection/Field Measurement
- Laboratory Analysis

Quality Assurance Reports to Management

The Settling Defendants shall attend a pre- QAPP meeting with U.S. EPA and the State. The Settling Defendants shall submit a draft QAPP to U.S. EPA and the State for review and approval by U.S. EPA, after reasonable opportunity for review and comment by the State.

B. Health and Safety Plan

The Settling Defendants shall develop a health and safety plan which is designed to protect on-site personnel and area residents from physical, chemical and all other hazards posed by this remedial action. The safety plan shall develop the performance levels and criteria necessary to address the following areas.

- Facility Description
- Access Control
- Personnel
- Levels of protection
- Safe work practices and safe guards
- Medical surveillance
- Personal and environmental air monitoring
- Personal protective equipment
- Personal hygiene
- Decontamination - personal and equipment
  Site work zones
- Contaminant control
- Contingency and emergency planning
- Logs, reports and record keeping

The safety plan shall follow U.S. EPA and State guidance and all OSHA requirements as outlined in 29 CFR 1910 and 1926.

C. Contingency Plan

Settling Defendants shall submit a Contingency Plan describing procedures to be used in the event of an accident or emergency at the site. The draft Contingency Plan shall be submitted with the prefinal design and the final Contingency Plan shall be submitted with the final design. The Contingency Plan shall include, at a minimum, the following:

1. Name of the person or entity responsible for responding in the event of an emergency incident.

2. Plan and date(s) for meeting(s) with the local community, including local, State and Federal agencies involved in the cleanup, as well as local emergency squads and hospitals.

3. First aid medical information.

4. Air Monitoring Plan (if applicable).

5. Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), as specified in 40 CFR Part 109 describing measures to prevent and contingency plans for

potential spills and discharges from materials handling and transportation.

D. Field Sampling Plan

The Settling Defendants shall develop a field sampling plan (as described in "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," October 1988). The Field Sampling Plan should supplement the QAPP and address all sample collection activities. Sample collection activities shall include, at a minimum, the following elements:

- Site background
- Sampling objectives
- Sample location and frequency
- Sample description
- Sampling equipment and procedures
- Sample handling and analysis

E. Construction Quality Assurance Plan

Settling Defendants shall submit a Construction Quality Assurance Plan (CQAP) describes the Site specific components of the quality assurance program which shall ensure that the completed project meets or exceeds all design criteria, plans, and specifications. The draft CQAP shall be submitted with the prefinal design and the final CQAP shall be submitted with the final design. The CQAP shall contain, at a minimum, the following elements:

1. Responsibilities and authorities of all organizations and key personnel involved in the design and construction of the Remedial Action.

2. Qualifications of the Quality Assurance Official to demonstrate he possesses the training and experience necessary to fulfill his identified responsibilities.

3. Protocols for sampling and testing used to monitor construction.

4. Identification of proposed quality assurance sampling activities including the sample size, locations, frequency of testing, acceptance and rejection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation. A description of the provisions for final storage of all records consistent with the requirements of the Consent Decree shall be included.

5. Reporting requirements for CQAP activities shall be described in detail in the CQAP. This shall include such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. Provisions for the final storage of all records shall be presented in the CQAP.

V. SUMMARY OF MAJOR DELIVERABLES/SCHEDULE

A summary of the project schedule and reporting requirements contained in this SOW is presented below:

Submission	Due Date
1. Pre-design Work Plan	Sixty (60) days after Notice of Authorization to proceed pursuant to Paragraph 10 of Consent Decree
2. RD Work Plan	Thirty (30) days after U.S. EPA's Approval of Final Pre-Design Work Plan
3. Preliminary Design (30%)	Thirty (30) days after U.S. EPA's approval of Final RD Work Plan
4. Intermediate Design (60%)	Thirty (30) days after receipt of U.S. EPA's comments on the Preliminary Design
5. Prefinal Design (95%)	Thirty (30) days after receipt of U.S. EPA's comments on the Intermediate Design
6. Final Design (100%)	Thirty (30) days after receipt of U.S. EPA's comments on the Prefinal Design
7. RA Work Plan	Thirty (30) days after U.S. EPA's approval of the final design submittal

8.	Award RA Contract(s)	Thirty (30) days after receipt of U.S. EPA's Notice of Authorization to Proceed with RA
9.	Pre-Construction Inspection and Meeting	(15) days after Award of RA Contract(s)
10.	Initiate Construction of RA	15 days after Pre-Construction Inspection and meeting
11.	Completion of Construction	15 days after receipt of U.S. EPA's authorization to proceed with RA or as approved by U.S. EPA in RA construction schedule
12.	Prefinal Inspection	No later than 15 days after completion of construction
13.	Prefinal Inspection Report	15 days after completion of prefinal inspection
14.	Final Inspection	15 days after completion of work identified in prefinal inspection report
15.	Final O&M Plan	No later than Prefinal Inspection
16.	Construction Completion Report	30 days after final inspection
17.	Final Construction Report	30 days after final construction
18.	Completion of Remedial Action Report	30 days after final inspection
19.	Completion of Work Report	See Consent Decree and Task 4.D.3 of this SOW

APPENDIX A

The following buried waste and contaminated soils will be excavated and treated by low temperature thermal treatment (LTTT) to meet clean up levels: 1) buried wastes in the Off-site Area; 2) soils contaminated with PCBs at a level greater than 10 ppm in both the On-site and Off-site Areas; and 3) isolated VOC-contaminated soil not within the areas to be addressed by In-situ Soil Vapor Extraction (ISVE). All LTTT residuals will be deposited back into the excavations after meeting appropriate health-based remediation levels identified below. LTTT treatment residuals can contain up to 2 ppm PCBs, however, in order to be used as cover material treatment residuals must not contain more than 1 ppm total PCBs.

All buried waste and soil will be treated to a cumulative carcinogenic risk of 3.3 x 10-5, and a cumulative noncancer risk of HI < 1. For carcinogenic contaminants, these remediation levels represent carcinogenic risk of 1 x 10-6 for individual contaminants. Based on the number of carcinogenic contaminants, the cumulative risk that must be attained is therefore 3.3 x 10-5 for carcinogenic contaminants.

For noncancer contaminants, these remediation levels represent a noncancer risk of HQ = 1 for individual contaminants. The range given for individual noncancer contaminants is based on the number of noncancer contaminants detected in site soils. The actual remediation level will depend on how many noncancer contaminants are detected in the particular remediation area and must represent a cumulative HI < 1.0.

Technology limitations and detection limits may affect the attainment of these levels for individual contaminants, however, the cumulative risk must meet 3.3 x 10-5 cumulative cancer risk and a cumulative HI < 1.0 total noncancer risk.

The cleanup level of 500 ppm lead for contaminated soils is based on the Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER Directive 9355.4-02). This guidance sets a clean-up range of 500-1000 ppm lead. The most conservative value was chosen due to the large number and high levels of other site contaminants. This clean-up level for lead may need further evaluation and refinement through the use of the U.S. EPA Uptake Biokinetic (UBK) Model, as required in pre-design.

Isolated pockets of heavy metal-contaminated soils greater than 500 ppm lead in both the On-Site and Off-Site Areas will also be excavated, may be treated by LTTT to remove VOCs and SVOCs, possibly immobilized to remove the hazardous waste characteristic for metals, and sent off-site for disposal.

The cleanup level of 10 ppm PCBs with 10" soil cover is based on TSCA policy for unrestricted access. U.S. EPA guidance suggests a concentration of 1 ppm for PCB cleanup based on the standard exposure assumptions under the residential use scenario. A ten inch soil cover has been estimated to give an additional order of

magnitude protection. Therefore, a cleanup level of 10 ppm with 10" of clean soil cover would provide protection at the 10-5 level. Soil and waste exceeding 10 ppm will be treated to 2 ppm PCBs in order to achieve a clean up level equivalent to incineration. If treatment of soil and waste cannot achieve 2 ppm, the soil and waste will be sent offsite in compliance with TSCA.

PCB treatment criteria cannot be met through dilution of material to be treated. Treatability studies will need to be conducted to determine if LTTT can treat to 2 ppm total PCBs. If the technology fails to meet this cleanup objective then PCB contaminated soils greater than 10 ppm must be sent offsite to a licensed TSCA landfill or incinerator.

Final Remediation Levels from ROD			Corresponding Risk	
Chemical	Remediation Level mg/kg	Basis	Cancer	NonCancer
CPAHs	0.0026	Risk	1.0E-06	NA
Tetrachloroethene	1.1	Risk	1.0E-06	NA
bis(2-Ethylhexyl) phthalate	1.1	Risk	1.0E-06	NA
Aldrin	0.002	Risk	1.0E-06	NA
Tricholorethene	5.3	Risk	1.0E-06	NA
Isophorone	7.2	Risk	1.0E-06	NA
Styrene	1.7	Risk	1.0E-06	NA
Pentachlorophenol	0.43	Risk	1.0E-06	NA
Benzene	1.0	Risk	1.0E-06	NA
4,4'-DDD	0.12	Risk	1.0E-06	NA
2,4-Dinitrotoluene	0.044	Risk	1.0E-06	NA
1,1-Dichloroethene	0.098	Risk	1.0E-06	NA
Carbon Tetra-Chloride	0.38	Risk	1.0E-06	NA
bis(2-Chloroethyl) ether	0.027	Risk	1.0E-06	NA
4,4'DDT	0.088	Risk	1.0E-06	NA
Chloroform	9.5	Risk	1.0E-06	NA

Hexachlorobutadiene	0.36	Risk	1.0E-06	NA
1,2-Dichloroethane	0.64	Risk	1.0E-06	NA
Methylene Chloride	6.2	Risk	1.0E-06	NA
1,2-Dichloropropane	0.42	Risk	1.0E-06	NA
Hexachlorobenzene	0.018	Risk	1.0E-06	NA
gamma-BHC (Lindane)	0.046	Risk	1.0E-06	NA
Cyclic Ketones	7.3	Risk	1.0E-06	NA
1,1,2-Trichloroethane	0.51	Risk	1.0E-06	NA
n-Nitrosodiphenylamine	12.0	Risk	1.0E-06	NA
1,1,2,2-Tetrachloroethane	0.28	Risk	1.0E-06	NA
Vinyl Chloride	0.031	Risk	1.0E-06	NA
alpha-BHC	0.0047	Risk	1.0E-06	NA
beta-BHC	0.016	Risk	1.0E-06	NA
2,6-Dinitrotoluene	0.044	Risk	1.0E-06	NA
4,4'-DDE	0.16	Risk	1.0E-06	NA
1,4-Dichlorobenzene	2.4	Risk	1.0E-06	NA
Heptachlor Epoxide	0.0033	Risk	1.0E-06	NA
Antimony	15 - 0.5	HI	NA	1.0-0.03
Toluene	5,000 - 167	HI	NA	1.0-0.03
Cadmium	51 - 2	HI	NA	1.0-0.03
Ethylbenzene	1,300 - 43	HI	NA	1.0-0.03
Barium	2,600 - 87	HI	NA	1.0-0.03